Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY WEEK
BY TELEPHONY PUBLISHING CORP.
116 S. MICHIGAN AVE., CHICAGO, ILL.

JUNE 25, 1921. [VOL. 80. NO. 26.]
Entered as second-class matter Sept. 4, 1906, at the post office at Chicago, Ill., under act of March 3, 1879.

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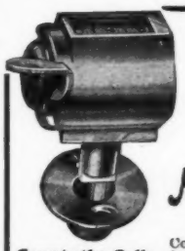

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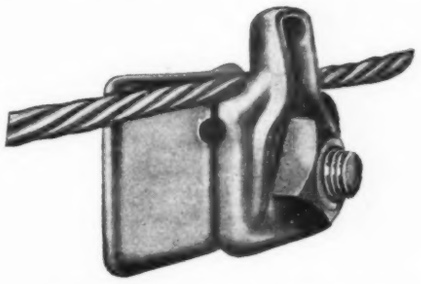

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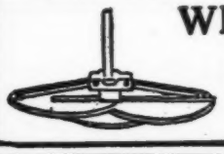

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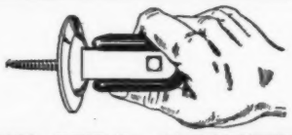

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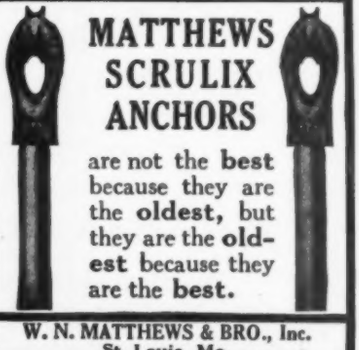

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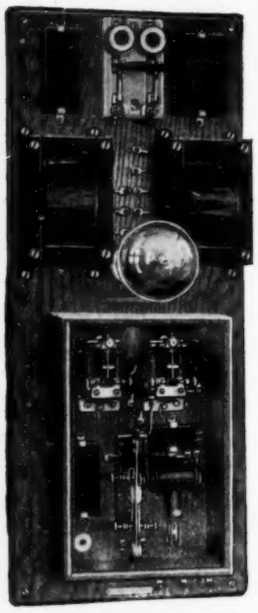

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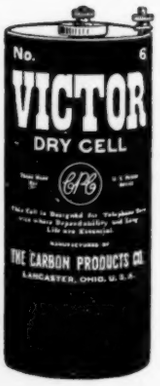

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Telephony

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves.

PUBLISHED WEEKLY BY TELEPHONY PUBLISHING CORP.
116 S. Michigan Ave., Chicago

H. D. FARGO, President and Treasurer.
G. M. ALLEN, Mgr., Copy Department.
S. R. EDWARDS, Editor and Secretary.
J. R. HASTIE, Vice-President and Advertising Manager
S. J. BORCHERS, Assistant Advertising Manager.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1879.

Volume 80
Number 26

CHICAGO SATURDAY, JUNE 25, 1921

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

CURRENT OPINIONS AND COMMENTS

At a recent meeting, one of the directors of the United States Independent Telephone Association laid considerable stress on the importance of telephone companies getting busy on the federal taxation questions now before congress.

He raised the same points that have been urged in these columns, and impressed upon the board the necessity of action to protect telephone interests and all public utilities in any amendments that may be adopted modifying the existing government tax system.

Congress is holding hearings on this vital subject at the present time, and the result will be bills recommended for passage that no doubt will make material changes in the laws now in effect.

Various measures have been introduced in congress changing the tax scheme, and the hearings have developed many different propositions, but aside from a few outstanding features, so far they have not outlined any real definite program. This gives the telephone companies and other utilities an opportunity to present their claims and protect their interests.

One of the outstanding points referred to is the general agreement that the excess profits tax is to be abolished and replaced by a considerably higher rate for the corporation tax. Nearly everybody favors the repeal of the profits tax, which is held largely responsible for general business troubles, and general business will be more than willing to stand an advance in the corporation rate for the sake of getting rid of it; but telephone companies and most utilities will be injured, instead of helped, by such a change if no other amendment is made.

* * * *

The reason for this is not far to seek. Few public utilities have had any excess profits tax to pay, in recent years, so elimination of that part of the law would not lighten their burden at all. An increased rate in the corporation income tax, however, would bear heavily upon them.

They would, in fact, be "the goat" if the taxation readjustment did not provide them with relief adapted especially to fit their cases. This is what the telephone and other utility associations should formulate, and then urge its adoption by the congressional committees.

It would be no more than justice to exempt utility corporations from the proposed increase in the tax rate that is to be imposed on the other businesses which are happy to be relieved of the profits tax burden. Realizing no benefit from repeal of the profits tax, it is manifestly unfair to compel the utilities to pay the higher rate that will be substituted for the profits tax.

* * * *

Something should also be done regarding the flood of tax-exempt bonds that come into competition with utility and industrial securities and compel their issuing companies to pay 9 and 10 per cent for their money. The man in the street was amazed to learn the other day that the Federal Reserve Bank put United States government bonds in second place as collateral for loans.

First place was given to bonds issued by states and municipalities, because they are free from income tax. It comes as a shock to the average citizen to find that a federal bank values federal bonds less than state and municipal bonds as security, and the result was that Liberty issues took another slump.

Big investors put their money into municipal and state bonds because they are entirely exempt from the income tax. Congress should take some action for the protection of other securities that are placed at such a disadvantage, and the utility interests should not forget they have a big stake in the matter. Telephone companies, of course, are included in this suggestion.

General business interests feel disappointed that Washington is devoting more attention to tariff and other matters than to tax revision, and pressure is being brought to bear to hasten action on this subject which is of such vital importance.

Special interests which hope to profit by tariff legislation should not be permitted to monopolize the attention of congress. That attention should be concentrated on affording the relief which will apply to everybody.

* * * *

According to the old saying, "Comparisons are odious," but they are also decidedly illuminating. The statement has

been made frequently of late that telephone service is the cheapest commodity in general use, and some figures compiled by the department of home economics of the Ohio State University prove the assertion with convincing force.

Based on an examination of the expenditures of families with annual incomes ranging from $1,500 to $6,000, the department finds that the average family spends but 6.49 per cent of its income for public utility service—telephone, gas, electricity and street car fares. *Telephone service costs but 1 per cent of income.*

Juggling with figures is considered by some as an innocent pastime, but there is nothing to indicate that the economists who made this survey intended to favor the utilities. It showed that while utility service costs less than 7 per cent of the average income, the other items of the family budget consisted of: food, 43 per cent; rent and taxes, 17 per cent; clothing, 13 per cent and miscellaneous expenses, 20 per cent.

Surely none of the utilities—and especially the telephone—need blush for the modest tax they impose on the household purse.

* * * *

In the general excitement which usually attends the close of a tumultuous session, it is difficult to know at once just what new laws the Illinois legislature passed, but it is certain that the home rule politicians failed to reap the harvest they expected. A new public utilities act was passed, but those advised say it follows the lines of the old statute very closely—in fact, that it is practically a copy, save that it bestows a new name on the state commission, and that some of the provisions are worded differently although covering just about the same points as the old.

The home rule features of the political propaganda which aimed to destroy rate regulation by the state are designated as valueless for that purpose. The crusade for home rule was carried on by the political machine with a great flourish of trumpets in order to convince the public that the campaign promises were fulfilled, but the peril of discarding the principle of state regulation against the advice and wishes of the business element, apparently, made the politicians hesitate to go through with their advertised plans.

The promise of five-cent street car fares and the foolish talk of home rule for state-wide utilities, which came from the Chicago city hall crowd, were labeled "bunk" by the downstate legislators and relegated to the discard.

* * * *

At this writing the most important changes made in the law are said to be changing the name of the commission to "Illinois Commerce Commission," and increasing its membership from five to seven members, each of whom is to have an assistant. The taxpayers no doubt will think this a queer way to fulfill a campaign pledge to abolish the commission altogether.

The Upper and Nether Millstones

Presentation of Facts Tending to Show That Under Present Conditions Investment in a Telephone Property is Caught Between the Upper Millstone of Law and the Nether Millstone of Necessity Development of Service

By Chas. S. Norton

Telephone companies are institutional and not commercial, functional and not industrial concerns. Their management, the money invested in their physical property and the services of their employes are for the sole purpose of giving service to the public, and not making money for the stockholders.

The law permits them to earn only a fair return upon the investment and not a profit upon the business. Telephone companies belong in the same class as colleges, churches and hospitals, which are organized, founded and maintained for purely public service, and not in the class of manufacturing, mining, merchandise or other industrial concerns which are organized and maintained for profit and private gain.

The purpose for which telephone companies were organized was radically changed with the advent of public service commissions and other state regulatory measures. Prior to the advent of such regulatory measures, a vast majority of the present telephone companies were organized under the then existing laws for purely commercial purposes. Men put money into them to make money out of them.

There was a clamor on the part of the public for telephone service. Companies were organized to give this service. It was their commodity for sale, the same as woolens are the commodity of woolen mills, or automobiles the commodity of automobile factories.

The profits which could be made upon the sale of their service were limited by the same factors that limited the profits on the sale of any other commodity and might be large or small, just as these factors had a bearing upon the business. The main factors governing the profits on the sale of any commodity are the demand on the part of the public for that particular commodity, ability to supply on the part of the company, competition and management of the company's affairs.

With telephone companies, there was plenty of ability to supply and a growing demand for the service, and well-managed telephone companies made money until competition entered and virtually destroyed all profits in the business.

For a score of years competition played havoc with the profits in the business. Communities were burdened with two systems and a divided service. Regardless of the healthy demand on the part of the public for service, rates were cut to such a low level that companies abandoned all hope of profits and were even unable from their revenues to keep their plants properly maintained or to pay efficient employes so as to give good and satisfactory service.

The business was getting in a very bad way, both for the companies and the public, when the public stepped in and took control of the business by legislative acts and the appointment of commissions to regulate rates and conditions of service.

This step on the part of the public took telephone companies out of the class of commercial concerns, and reduced them to purely functional institutions. The public virtually said to telephone companies: "Thou shalt not profit on our necessity, neither shalt thou lose money on thy investment, but thou shalt give service."

The results were that investors in telephone securities were denied any further right of speculation or profit and forced to loan their moneys to the public at the usual rate of interest—provided it was earned. The power of profit was denied but the guarantee of a fair return was not given.

The question is often asked: "What right has the public to regulate the return, the rates and service of a telephone

company when it has no right to regulate the manufacture, price and sale of automobiles, or the price of clothing or groceries"?

The answer is found in the fact that telephone companies have a right to construct their lines over and under the public highway free, and the necessity of the service to the public welfare. If telephone companies had to negotiate and purchase from property owners, the right to construct their pole lines, install their conduits and string their wires, the expense of such a right of way would be enormous. In fact, in cities such a procedure would be next to impossible. So the public has turned over to telephone companies the free use of its streets, alleys and public roads, and reserved unto itself the right to say upon what condition these public ways shall be used.

The public service commission law is merely an enlargement of former city ordinances governing telephone companies. Since the public furnishes the right of way for telephone companies, it has a very substantial investment in the company's property, in fact the public is one of the company's largest stockholders and has a right to say how its investment shall be used.

In addition to this, the law confers upon telephone companies the right of eminent domain. That is, it gives them the right to condemn private property and appropriate it for its own use upon the payment of a reasonable consideration. Industrial and commercial concerns have no such rights.

Another reason why the state exercises the right to control the operation of telephone companies is that telephone service is one of the absolute necessities of modern community life. Destroy the telephone service in any city in the United States while all other cities still continue to have the service, and the city in which the service is destroyed would deteriorate until its factories would have ceased to function, its business house be tenantless and its homes without inhabitants.

Its industrial and community life would be destroyed, for such a city could not compete with other cities whose industries use the telephone to facilitate and cheapen production, whose merchants use it as a means of selling goods and the homes use it to keep in constant touch with each other and the business life of the community. If the Woolworth building would become a mere monument were its elevator service to cease, New York City itself would become a graveyard of defunct business, dead banks, and depleted homes, were its telephone service destroyed.

Hence, because of the public investment in telephone companies' rights of way, because of the extra rights given telephone companies over other commercial concerns, and because of the public being dependent upon telephone service for its own security and welfare, the public exercises its right to control telephone companies and regulate their rates and service.

This change in the fundamental purpose of telephone companies has caused a change in the relationship of employer and employe. When telephone companies were commercial, the stockholders who owned the property were the sole arbiters of its use, the service, and the conditions under which employes should work. The property was theirs and it was no other persons' affairs whether they wrecked it, properly maintained it, got no profits out of operation or made huge profits. The employes worked for them and them alone.

With the change from a commercial to a functional basis, both stockholders and employes are essentially working for the public—the stockholders by means of their invested capital, the employes by means of their skill and time as their investment.

These two factors—capital and labor—have a mutual interest, are co-operative, and are striving for the same objects: First, to render the public good and efficient service; second, to have a fair return upon their respective investments—capital by means of dividends and interest for its money, labor by means of wages and proper working conditions for its skill and time.

Under existing conditions capital is entitled to its return just as much as labor. This proposition is self-evident. There can be no justification in giving labor a full and fair return upon its investment while capital goes without any return. If the revenues of the company, as fixed by the state, are not sufficient for both to have a fair return, then each should share its proportionate and respective loss.

If this theory of the relation of capital and labor in furnishing telephone service is correct, what would happen if it were put into practical operation under present conditions? A majority of the telephone companies in the United States would have to close their doors and cease operation within twelve months, for it is a well known fact that a majority of telephone companies are not permitted to earn sufficient revenues to pay capital and labor both a fair return.

When labor cannot get a fair return for its services with a telephone company, it is at liberty to withdraw and invest its skill and time in some other business. It is mobile and self-determining, so labor is always in a position to exact some return, even if not a fair one, upon its investment.

Not so with capital. It is tied to the post. If it is getting no return upon its investment it cannot withdraw its money to invest elsewhere until it can find a purchaser. But who wants to purchase dead

THOSE TELEPHONE TRAFFIC ARTICLES.

Early this week a letter came into the office. It was written by a telephone man immediately upon reading the announcement in last week's issue of the series of articles on telephone traffic which begin in next week's issue of "Telephony." Here is what he says:

"We were much pleased to read this notice because traffic is something in which we are very much interested, and there is but little information to be gained from books.

"We hope that your articles will be written by men who thoroughly understand telephone traffic so that the information you publish will be practical."

The first paragraph of this quotation explains why "Telephony" has arranged for the publication of these articles which will set forth the elementary principles of traffic work. They will be of interest not only to chief operators, supervisors, operators, but managers and commercial men as well.

The author of the articles is a practical traffic man of many years' experience in both small and large exchanges. He is E. L. Gaines, traffic superintendent of The Home Telephone & Telegraph Co., Ft. Wayne, Ind. Those who know Mr. Gaines are convinced that he knows traffic work, in addition to telephone work generally.

Mr. Gaines has written a series of about 25 articles which will be published during the ensuing six months. They embody all the latest methods and ideas in traffic work and are applicable to small as well as large exchanges, for Mr. Gaines began his telephone work many years ago as troubleman in a small exchange in Iowa—and he understands the problems of small as well as large exchanges.

The articles will deal with such subjects as peg, cord and plug counts, traffic records, position loading, service observation, night service, hiring and training operators, information records and switchboard marking, service standards, the chief operator, the supervisor, the traffic plant, and many other topics that are involved in the handling of telephone traffic.

This series of articles will contain just the information that operators and managers have been seeking for a long time. We know that "Telephony" readers will not want to miss a single one of these articles. A copy of "Telephony" of every issue for the next six months should be provided for every operating room. As it is frequently impossible to supply back numbers, the copies should be ordered in advance.

property? So capital must stay on the job even though it gets no dividends.

Not only this—it frequently must stay on the job, even when losing money, and borrow money with which to keep going in order to protect that which it has already invested. Capital cannot quit, even though it must borrow money to keep labor on the job while it is losing on its investment.

If the principle of capital and labor sharing losses proportionately were applied, labor would quit the job, the doors of many telephone exchanges would close, and the public in many places would be without telephone service.

It is strange that public service commissions cannot realize that when rates are inadequate to pay a fair return upon the investment of both capital and labor, they are grinding capital between the upper millstone of law and the nether millstone of necessity. Under such conditions, is it any wonder why some telephone companies cannot attract new capital with which to keep pace with the demand for their service, and to maintain and operate their property so as to give satisfactory service?

When the states, through their constitutional power, took charge of telephone companies, they found millions of capital invested and thousands of employes working. They said to capital: "We are going to place a limit upon your return, and you must stay on the job until you find someone to take your place."

But they did not, for they could not say to labor: "We will fix your maximum wages and you too must stay on the job."

They bound capital hand and foot while they left labor—the other essential factor in the telephone business—free, because they could not bind it.

The essential weakness of all public utility regulation is that the state has power to fix the rate of return on capital, but has no power to fix the price of material entering into the utility, or the price of labor necessary to operate the property.

So long as the state's only power to protect capital against fluctuating prices of material and labor lies in its power to fix rates, it should in all justice to capital fix a rate for service that will guarantee capital a fair return upon its investment. Not only a fair return but a return that will in prosperous years yield a fair margin of profit so that in less prosperous years this margin of profit will enable the company to continue to pay capital for its investment.

ARE YOU A CHIEF OPERATOR OR ONLY HOLDING HER POSITION?

By Miss Anne Barnes.

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

Are you a chief operator or only holding her position? If you are the latter, move out of the way. You are stopping progress.

During the schools I meet many chief operators who are only chief operators in name. They know it and often acknowledge the fact to me.

Their excuse for not being better chief operators is that they were one of the girls for so long. After they became chief operators, their greatest concern was that the operators would not see any difference in them. When matters came up which needed adjustments or decisions, they feared to make them, even if they were sure of what was needed for they did not want to set themselves apart from the force.

Many times they were not sure and, rather than acknowledge it, they did not take any action or obtain any advice from the manager. Then the unsettled matter became one of the loose ends that caused a tangle later. If called to account by the manager, the answer was: "Well, I didn't know." I wonder whether in any other endeavor such an answer would be accepted by an employer.

All the time if such chief operators had only realized it, they were losing favor with the force, for operators do not like to take orders from chiefs who are afraid to give them.

Some chief operators give an order in a half apologetic manner as for example: "The *manager says* we are not to visit at the switchboard, girls. He will probably call you if he catches you."

"Well," says one of the shrewd ones, who knows the chief operator is trying to give an order over the manager's shoulder, "you tell him for me, that if he doesn't like it to come to me and not send word."

Really, I do not blame that operator, *do you,* Miss Chief-Operator-In-Name-Only? Don't you wish you had just a little of her backbone? She sees an empty chair where you are sitting. She has probably never heard you give an order of your own. It has always been "he," "they," "the manager."

When a chief operator is willing to draw the salary the position entitles her to, she should not hide behind her manager as though she were scared to death of her force. She may make blunders but at least she is doing something. "Doing is learning to do better."

Of course, snapshot judgments must be avoided, for three out of five decisions made without study and plans generally fall through.

The chief operator's position is not a sit-on-a-throne-and-be-obeyed proposition; neither is it a chief-operator-in-name only proposition.

She must know the work of her operators *better* than they do; she must know her force and be able to see the interest of the company and of the operators in every situation which calls for executive decision.

Abraham Lincoln said: "Everyone is said to have his peculiar ambition—whether it is true or not I can say for one, that I have no other so great as that of being truly esteemed of my fellow men by rendering myself worthy of their esteem."

Purchases a Church Bell by Listening to it Over Telephone.

Recently the editor of Telephone Topics heard of a novel use to which the telephone was put. It was none other than the selection of a church bell by telephone.

The head of a well-known Boston insurance company happened to be chairman of a church committee which was appointed to purchase a bell for a suburban church. He got into telephone communication with the Manarli Bell Co. of Troy, N. Y., with the idea of making arrangements for the committee to visit that city and select the bell.

While talking on the telephone he heard one of the company's bells toll and the sound was so clear and distinct that the idea at once occurred to him to dispense with the trip to Troy and select the church bell by its sound over the telephone.

Arrangements were accordingly made to have the committee assemble in his office on a certain day and hour, and the bell company, being apprised of the plan, was in readiness at the same time. The New England Telephone & Telegraph Co. did the usual good job in furnishing the right kind of service and after several bells had been rung and rerung and their tones heard clear and distinct in the Boston office, one was unanimously chosen, and the telephone company received the plaudits of both buyers and sellers for another unusual service.

Theory of Guided-Wave Telephony

Principles of Multiplex Telephony—High Frequency Equipment—Practical Results of Utilization of Metallic Circuits for Guided-Wave Telephony—Difficulties Encountered in Practice—Paper Presented Before the Franklin Institute

By Charles A. Culver, Ph. D.
Canadian Independent Telephone Co., Toronto

In considering telephonic transmission by means of carrier currents the labor behavior of physical circuits as high-frequency channels becomes of prime importance.

Functioning of a Physical Circuit as a H.F. Carrier.

One of the first factors which commands one's attention is the fact that in high-frequency work a physical line acts as a lumped capacity. In other words, at radio frequencies the line reactance is in the nature of a capacity instead of an inductance. There is abundant evidence of this. The capacity of a 100-mile No. 10 aerial telephone pair is approximately 0.8 m. f., and this line capacity is in series with the bridging inductance and capacity of the connected high-frequency unit.

Since the latter has a value of the order of 0.001—2 m. f., the bridging circuit should act when connected to the line as though shorted by a condenser of relatively large value. Such is found to be the case in practice. The setting of the bridging condenser is the same whether the apparatus is connected to a line 50 miles or several hundred miles in length.

Indeed, it has been observed that a transatlantic cable will give practically the same resonant setting on the bridging condenser as will a circuit of a few hundred feet in length. Further, since the change in capacity due to a difference in the size of line wires is small compared with the total capacity of a line, and since as shown above, the line capacity is in series with the high-frequency bridging capacity, it will not appreciably alter the tuning of the guided wave telephone set if it becomes necessary, owing to operating conditions, to connect the high-frequency equipment to various metallic circuits. The resulting element of practical operating flexibility is thus apparent.

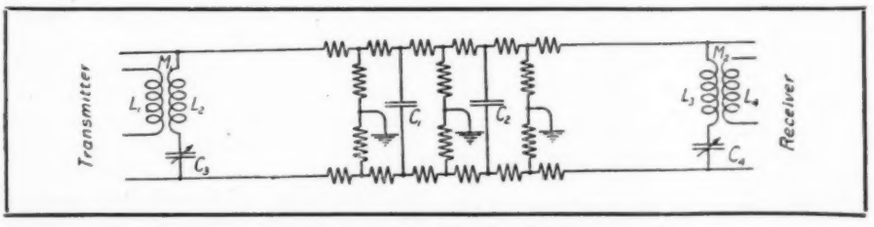


Fig. 13-A.—The Several Factors of Line Organization.

In General Squier's original paper, before referred to, the conclusion is reached that the line reactance is in the nature of an inductance, rather than of a capacity. That conclusion was reached because the capacity reactance of the bridging condenser at resonance exceeded as computed, the inductive reactance, and since at resonance the capacity and inductive reactances should be equal, it was thought that the line reacted in such a manner as to supply the difference.

There appears, however, to be an error in this point of view. Mutual inductance undoubtedly existed between the coupling inductance P and S, Figs. 1 and 2, in General Squier's organization. Hence in computing the inductance value the mutual inductance should have been considered.

In dealing with the inductance and capacity factors, the line as a whole must be considered. The line organization appears to resolve itself into two resonant circuits having electrostatic coupling. Fig. 13*A* probably represents the several factors (except radiation resistance) as they obtained in General Squier's original experiments, and Fig. 13*B* as they obtain in a simple case in actual g-w. practice.

In the latter Fig., A represents a transmitting unit and A_1 the corresponding resonant receiving unit; B, the second transmitter, and B_1 the corresponding receiving organization. So far as the guided-wave organizations at the left of the figure is concerned, the first mile or less of physical line determines the effective line capacity C_1, and in a corresponding manner C_2 is related to the coupled system at the right.

As additional experimental proof of this tentative theory regarding the functioning of a physical circuit as a high-frequency channel, it may be noted that the physical line may be "dead shorted" at some point between the two terminal stations without interrupting commercial conversation on the high-frequency channel. Further, if the bridging circuit of a given transmitting set is adjusted to give maximum line current, and the tuning of the receiving organization, including its bridging circuit, be changed, it becomes necessary to readjust the transmitter circuits in order to maintain a resonant condition with the line.

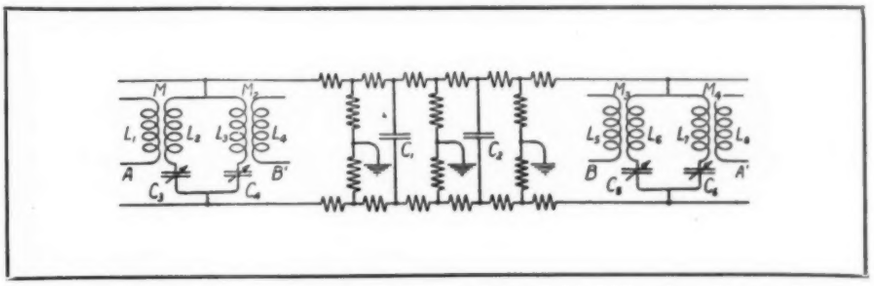


Fig. 13-B.—Line Organizaion in Simple Case in Guided Wave Practice.

Interference.

In discussing the possibilities and limitations of guided-wave telephony, the question of interference naturally arises. This point has been partially covered in the discussion concerning the use of power lines as high-frequency channels. It may be added in this particular connection that experience has shown that 110,000-volt, 25-cycle power lines running parallel to, and at some points within 50 feet of, the physical telephone system, produce no interference whatever in the guided-wave super-circuit.

It has also been found that guided-wave telephone channels may be successfully operated over a telegraph circuit which is being used for Morse duplex or for duplex printer operation.

There is a possibility of interference from continuous wave radio stations. This may result from the fact that the frequency of the wave, emitted by an undamped radio station, may chance to be near (within about 20,000 cycles) the frequency of a multiplex telephone carrier wave. The physical circuit which serves as a basis for the high-frequency superchannels will act as an antenna and thus intercept enough energy to produce a he-

terodyne effect with the undamped guided-wave telephone wave. In short, the effect in the guided-wave telephone receiver will be exactly the same as when two guided-wave telephone waves combine to form a "beat note," as previously discussed.

Spark radio stations may also be heard in the guided-wave telephone apparatus if the carrier wave used has the same value as the wave emitted by the radio station. This is particularly true if a single line wire and earth return is being used for the super-channel.

Since, however, the wave lengths of all radio stations are known, it is a comparatively easy matter to avoid radio interference, if such exists in any given case, by not using as carrier currents those waves which are near in frequency to the interfering radio wave.

With regard to atmospheric and other irregular extraneous electrical disturbances, commonly spoken of as "static" in the radio art, it may be said the guided-wave system is no more subject to interference from this source than is the ordinary telephone organization. When utilizing untransposed and poorly insulated telegraphic circuits as guides for high-frequency carrier waves, the interference due to atmospheric disturbances is naturally more marked than when connection is made to well-contructed telephone circuits. However, interference is, in general, decidedly less marked than in the case of radiotelephony. The author has never experienced but one occasion when communication by guided-wave telephony was interrupted by vagrant disturbances in the line, and this was when using a telegraph circuit as a guiding channel.

Attenuation and Efficiency.

In considering the system of guided-wave telephony, perhaps the most interesting, and from a purely scientific point of view, the most significant, is the question of the absolute and relative magnitude of the energy required to effect commercial communication by this means.

Let us first compare the over-all efficiency of guided-wave telephony with radio telephony. Using 100 miles and no extra-detector amplification as a basis for comparison, we find that experience shows that, when operating under average overland conditions, radio telephonic communication can be effected if the transmitting apparatus delivers 100 watts to the radiating system. This gives us a mean energy-distance ratio of one watt per mile.

In the case of guided-wave telephony, extensive engineering tests have shown that when utilizing a carrier current having a frequency of the order of 125,000 cycles, commercial communication can be maintained if the equipment will deliver five watts to a well-constructed physical telephone circuit consisting of a pair of No. 10 copper aerial wires. This gives a mean energy-distance ratio of 0.05 watt per mile. It will thus be seen that the guided-wave system is 20 times as efficient as radiotelephony.

In making this comparison, it was assumed that neither the radio nor guided-wave apparatus was connected to local land lines. If connections were made to local physical circuits, an additional amount of energy would be required in both cases for the purpose of amplifying the voice currents. As this would be of the same order in each case, and since its value would be a more or less fixed quantity and independent of the distance separating the high-frequency stations, it has been omitted from the comparison.

In passing to a consideration of the comparative efficiency of guided-wave transmission and communication by means of ordinary telephony, we come to the most vital part of our subject. This aspect of our discussion involves the question of attenuation, and again brings before us the original criticism of Doctor Jewett and others.

Doctor Jewett says[6]: "Further, a few simple computations will show that the attenuation of current at the high frequency which must be used in Major Squier's system is enormously greater than the attenuation at the frequencies which go to make up ordinary speech. Phenomena of current attenuation on long telephone circuits are not different in character for frequencies of from 15,000 to 100,000 periods per sec. than for frequencies of from 200 or 300 to 3000 per sec. *and the same attenuation formulas can be used.*" (The italics are mine.)

On this assumption, Doctor Jewett then proceeds to compute both the low and high-frequency attenuation constants for several sized conductors. Both computation and engineering experience show, however, that the attenuation in high-frequency transmission is not of the order indicated by Doctor Jewett's computations. It would appear that a serious error was made by Doctor Jewett in assuming that the standard attenuation formula applies in the case.

It is, however, a matter of experience that frequency *does* enter into the determination of the power-distance ratio. How, then, is this to be accounted for?

In dealing with high-frequency currents on physical conductor a certain amount of energy is in all cases *lost by radiation*. There is abundant empirical evidence that such radiation obtains in the case of high-frequency carrier waves on telephone and telegraph circuits. Indeed, it has been found possible to establish high-frequency telephonic communication between a moving train and a fixed station, the latter utilizing a physical circuit along the right of way as a high-frequency wave channel. A part then of the energy originally delivered to the line by the terminal apparatus is lost by radiation.

It is difficult to determine the law of radiation which obtains in the case of a physical circuit whose length is many times the wave-length of the high-frequency carrier wave. The problem is rendered particularly complex because of the fact that the physical circuit in question may be only one of a considerable number of other metallic circuits on the same pole lead, thus greatly modifying the electrostatic and magnetic field about the conductor.

The dissipation of high-frequency energy in a non-transposed telegraph circuit has been found by comparative tests to be very much greater than in the case of a transposed telephone circuit made up of the same sized conductors. There is some evidence for believing that the loss of energy is modified by the number of transpositions in the line. It is possible that a twisted pair would functionate advantageously. This explanation, however, is only tentative, not having been fully established.

In the foregoing discussion reference has only been made to open aerial lines. In the case of cables the dissipation of energy is due to dialectric loss, eddy currents in the cable sheath, and radiation, with the result that the attenuation in cables is somewhat higher than in open lines. The opinion appears to obtain that the attenuation in cables is prohibitive.

Practical experience shows that such is not the case. Our experience in working with frequencies up to 500,000 over lines, which included between two and three miles of cable, shows that it is unnecessary to terminate the high-frequency super-channel at the end of the open aerial line when establishing high-frequency multiplex service between cities.

In addition to the energy lost by radiation, there must also be considered the question of high frequency insulation resistance. Insulation which may have a high value for direct or low frequency e. m. f.'s frequently exhibit low values when high-frequency pressures are involved.

It is therefore evident that the value to be given to G is at present indeterminate. The relation for high-frequency attentuation which is finally evolved will probably contain a term or terms corresponding to G, and which will account for radiation and leakage. This term will undoubtedly prove to be a function of the frequency. Additional data must be at hand before such a working relation can be developed. Progress is, however, being made both analytically and empirically along this line.

The incorrectness of Doctor Jewett's attentuation values are even more strikingly shown when one examines the en-

[6] Multiplex Telephony—Discussion by Frank B. Jewett, A. I. E. E. Vol. xxx, Part ii, 1911.

ergy ratios which he evolves. For instance, he states that 300,000,000 times the energy would be required to telephone by means of a high-frequency 50,000-cycle carrier wave for a distance of 1,000 miles, over a non-loaded No. 8 B. W. G. copper circuit, than would be required for equal communication by ordinary telephonic means.

If we assume that the energy supplied to the circuit by the regular telephone transmitting organization is of the order of one watt, it is evident, on the basis of Doctor Jewett's assumption, that 300,000 k. w. would be required to effect equally good transmission by the high-frequency means.

Now, 50,000 cycles correspond to 6,000-meter wave, and it is a matter of common knowledge that direct radiotelephonic communication can be established when using a wave of this order with the expenditure of an amount of power not to exceed one three-thousandths part of that indicated by Doctor Jewett. In view of the fact that communication by means of high-frequency carrier waves is several-fold more efficient than by direct radio, Doctor Jewett's figures are plainly erroneous.

As before indicated, it has been established that when utilizing a carrier frequency of the order of 100,000 cycles, the energy input required in guided-wave telephony does not exceed five watts for the first one hundred miles. Though we do not at present know the complete law relating energy and distance in guided-wave practice, there is evidence for believing that the falling off of energy is not *more* rapid than indicated by an inverse square law. On this assumption it would require a high-frequency input to the line of something like 500 watts to cover a distance of 1000 miles, repeaters and extra-detector amplification not being used.

Further, in making the original comparisons of the guided-wave system with ordinary telephone practice, the critics apparently failed to take account of the fact that the audion, which forms an essential part of the Squier system, is inherently an amplifying device, and therefore, does not require as great an energy input from the line as does the ordinary telephone organization. Their original premise was, therefore, incorrect.

Unfortunately, it is not easy to set up artificial high-frequency lines, and thus be in a position to make high-frequency transmission measurements in the laboratory. This is due chiefly to the fact that it is difficult to simulate radiation as it exists in guided-wave practice. Progress is, however, being made along these lines and there is reason to expect that important disclosures concerning the laws governing high-frequency transmission will be made in the near future.

The factor that has tended most to inhibit progress in the high-frequency field is our preconceived notions. We have failed to realize that, in high-frequency work, we are dealing with phenomena which follow, in many cases, entirely new and unknown laws, and that we are led into serious errors when we attempt to apply laws which obtain in low (audio) frequency practice.

In this general connection the author is reminded of one or two typical instances of traditional scientific beliefs. Several years ago the writer suggested to one of the leading radio physicists that possibly one could abstract energy from the electromagnetic waves employed in radio communication by placing a long horizontal wire just above the surface of the sea. The scientist referred to held that such a system would not functionate as a receiving antenna because it would practically coincide with a surface of good conductivity. We know now that submarine craft communicate by radio when running awash and also when submerged.

During the war the writer suggested to one of the prominent research engineers that possibly the power required to effect transatlantic radio communication could be materially reduced if the ground connections of two such stations were made to the sheath of the same transatlantic cable. It was thought that the cable might serve to guide and confine the electromagnetic waves to a narrow channel rather than allowing them to spread in all directions. The engineer did not concur in the suggestion, basing his arguments upon laws which obtain in the case of direct and low-frequency alternating currents.

We are still of the opinion that the suggestion is worth trying.

Power Supply.

It is now common practice to use rectified alternating current as a source of power for operating the oscillating power tubes which supply the high-frequency carrier current to the line. Frequencies as low as 25 cycles are successfully employed.

By the use of smoothing inductances and condensers, all trace of alternating current "hum" is eliminated. By the use of such a power unit instead of a motor generator, the guided-wave apparatus can be arranged to respond instantly to remote control. Switching and articulation with local physical telephone circuit is thus greatly facilitated.

Uses and Advantages.

In the foregoing discussion we have endeavored to point out the limitations of the high-frequency multiplex system of telephony, and, incidentally, certain advantages. In dealing more specifically with the advantages, it is to be noted that, in general, guided-wave transmission gives a more nearly perfect reproduction of the voice than does wire telephony.

In ordinary telephony there are three inherent causes of distortion, viz., the microphone, the telephone receiver and that due to the line. The first two are, of course, present in the high-frequency system. The distortion due to the line is, however, absent. This is evident from the following considerations:

Since the quality of timbre of vocal sounds is due to the presence of overtones, the varying line current in ordinary wire transmission will also have a corresponding complex wave form. In short, when analyzed, this telephonic line current consists of several elemental constituent parts, each component having a different frequency. Since, under a non-resonant condition, attenuation is a function of the frequency, the components of the line current corresponding to the overtones in the voice will suffer different degrees of attenuation, with the result that the wave form will be modified. In ordinary words, tonal quality is not faithfully transmitted.

If, in comparison with the process just outlined, it is recalled that in guided-wave transmission a high-frequency alternating current of a single frequency serves as a carrier wave, and that speech is transmitted by varying the *amplitude* of this carrier wave, it will be apparent that there will be no distortion due to a multiple valued attenuation factor.

There is a possibility that guided-wave telephone equipment of such a nature will be designed that the ordinary microphone with its inherent defects will be replaced by a device which will give rise to much less distortion. It is also possible to improve the common telephone receiver in regard to faithfulness of reproduction.

If, and when, these improvements are brought about, we will have in guided-wave telephony a means of communication whereby practically perfect transmission of the voice may be had. But even under existing limitations, the faithfulness of voice production in guided-wave transmission, particularly when connection is not made to local land lines, is one of the distinguishing characteristics of this method of communication.

Another important aspect of communication is secrecy. When used as a direct private line of telephonic communication, as in the case of leased lines between business houses in different cities or for press work, we have in this method a system of communication which affords a high degree of secrecy. Common experience indicates how little real privacy obtains when employing the ordinary telephone.

While radio telephony has a distinct and very important field in communication at sea, it obviously has serious limitations when employed for strictly personal and business purposes. While there is no known means of communication which cannot be "tapped," yet from the

nature of the system, direct guided-wave telephony possesses the greatest element of secrecy of any telephonic means of communication. When, however, the high-frequency super-channel is used as a trunk line and connected at either or both ends with local physical telephone circuits, the element of secrecy is no greater than when employing a physical circuit for the entire distance.

Another advantage of the guided-wave system is that communication may be maintained between two points when the physical circuit which serves as a guide for the high-frequency waves is out of commission for ordinary telephone service. Both wires of the physical pair may be cut, the line short-circuited and at least one of the wires grounded without interrupting communication over the super-channel. This has been repeatedly demonstrated and naturally means much in emergency service of all kinds.

Another feature to be noted in connection with guided-wave telephony is the flexibility of the system. When used as a through trunk channel, a given set of equipment may, as previously indicated, be instantly shifted from one physical circuit to another.

Further, the entire terminal guided-wave equipment may be quickly transported from one point on a physical system to another, thus making it possible to readily increase the traffic-carrying capacity of the lines between points where a temporary congestion exists, due to seasonal or other causes.

An added element of flexibility arises from the fact that various sections of physical circuits may be tied together to establish a through super-channel for trunk operation. For instance, several physical circuits may radiate from an intermediate point. Two physical circuits centering at this point may, by suitable means, be connected for the purpose of setting up a through guided-wave channel, and at the same time the two physical lines may be connected to any of the other lines centering at the point in question. In other words, the tying together of the lines for guided-wave working in no way limits the flexibility of the physical lines for regular telephonic operation.

An important possible application of telephony by guided waves is that of train dispatching. Reference has already been made to the fact that energy is radiated from a physical line which serves as a guide for high-frequency carrier currents. Though the amount of energy thus radiated is not great, it has been shown by practical tests that it is sufficient to make possible the establishment of telephonic communication between a moving train and the fixed stations connected to one of the physical circuits paralleling the track.

This is accomplished by installing on the train a radio-telephone equipment connected to a suitable antenna system placed at the top of a car or cars. When the two systems are properly adjusted there will be a mutual interchange of energy between the train's antenna and the physical telegraph or telephone circuit which is conveying the high-frequency carrier current from a fixed station.

The train equipment may be located in the baggage car with leads extending to the engine cab. The engineer could be equipped with a standard anti-noise transmitter and a receiver helmet similar to that used for radio telephony on aeroplanes. So equipped, the engineer of a train could be in continuous and reliable communication with the train dispatcher. The utility of such a system in train dispatching is obvious.

Another possible application of a similar nature to the above would be the dispatching of electric railway traffic by this type of telephony. Small low power guided-wave sets could be installed on interurban cars and the trolley wire utilized for the purpose of guiding the carrier waves to and from central fixed points. The power supply used for operating the cars is usually of such a nature that it could also be directly utilized for operating the telephone apparatus. The conductor would thus be enabled to speak directly from the car to the operating official at the central office. The necessity for installing and maintaining an independent telephone circuit for dispatching purposes would thus be obviated.

Thus, there are several important special fields for the practical application of this comparatively new means of communication.

It is, however, as private leased lines and for long trunk circuits that guided-wave telephony will probably find its greatest field of usefulness. As already indicated, ordinary local subscribers' telephones may be connected through the usual central switchboard to the high frequency apparatus, the switching being accomplished in substantially the same manner as when connecting to any physical toll circuit. In this manner, the guided-wave system is being commercially used to give additional channels for the handling of "long-haul" traffic.

Although independent guided-wave terminal equipment must be installed for each super-channel that is established, yet the initial and maintenance cost of additional physical circuits is substantially greater than the corresponding cost for the high frequency installation. In general, the financial saving increases as the length of the line increases.

In this discussion, we have confined ourselves to guided-wave telephony. There is, of course, a corresponding field in connection with telegraphy. Multiplex telegraphy by means of guided waves is already a commercial fact. We hope in a subsequent paper to deal with the telegraphic aspects of the case.

In conclusion, it may be said that we have in guided-wave multiplex telephony and telegraphy a distinct branch of communication engineering—a new art—which is to command the ability of the most able minds in both pure and applied science. And who shall say whither it will lead?

Keystone Telephone Co. Earnings for Month of May.

The Keystone Telephone Co., of Philadelphia, has issued its comparative statement of earnings for the combined companies for the month of May, 1921, and for the five months of this year ending with May 31, as follows:

	For month ended May 31, 1921.	Year previous.
Gross earnings	$145,171	$144,353
Operating expenses and taxes	97,424	92,846
Net earnings	$ 47,747	$ 51,507
Less interest charges	38,738	35,338
Balance available for dividends surplus and reserve	$ 9,009	$ 16,169

	For five mos. ended May 31, 1921.	Year previous.
Gross earnings	$723,397	$717,821
Operating expenses and taxes	509,626	461,260
Net earnings	$213,771	$256,561
Less interest charges	192,904	177,776
Balance available for dividends surplus and reserve	$ 20,867	$ 78,785

Telephone Company Ordered to Remove Conduits Temporarily.

The city council at Logansport, Ind., has adopted a resolution directing the Logansport Home Telephone Co. to remove its conduits from an alley extending from Fifth to Sixth street and between Market and Broadway in Logansport. Sixty days are given the company in which to comply with the order.

The resolution stipulates that the conduit shall remain removed until the drain which is now under construction in the alley is built. When the work on the drain is completed, the telephone company will then be permitted to return its conduit.

When the construction of the drain began, the Logansport company obtained an injunction against the city and the contractor who is building the drain to prevent them from blasting. It set out in its complaint that the shock and concussion of the blasts would wreck the telephone cables in the conduits and injure the service for months. A temporary injunction was granted.

Efforts of the board of works to effect a compromise with the telephone company resulted in the council's action, it was said.

Sundry Snapshots Along the Trail

Observations and Comments, Pertinent and Otherwise, On the Sunshine and Shadows of Telephone Work

By Well Clay

Says Old Man Bones, says he to me:
"It always makes me laugh, b' gee,
When Old Jasper Smith starts out t' say
What a fine feller he is, an' praise the way
He handles his business affairs, an' how
Well he's thought of in th' community now.
He is some windy—that is to say—
On a popular subject, he c'n talk all day;
But the most popular subject 'at he c'n find
Is Jasper Smith; an' he calls t' mind
How liberal he is with the fellows what rent
His farms from him, an' how he's went
Out of his way t' help 'em out;
Until you 'ud think he was jest about
To make a present to every one
Of the farm they was on, an' then, fer fun,
Throw in the stock, an' other things,—
That is, to judge by his talk, b' jings!
But before passin' judgment let me advise
You t' interview his tenants—'twould open yer eyes
To the fact that Old Jasper ain't runnin' behind,
An' that all of his talk is jest a blind."

It seems that the public is to some extent prone to judge the telephone business a good deal the same way the old man above judges Brother Jasper. They think the telephone companies are making talk to blind the people to the real state of affairs; that the telephone companies are making money all right but want to confuse the public mind and divert attention from the nice rakedown they are getting, while other things, to a large extent, are going down in cost.

It is really quite a job to convince some people that most companies are really running behind. In fact, you can't do it at all with any sort of argument because, at best, the public see that you are taking in money all the time over the counter as they pay it in, but they seldom see any paid out. The unseen depreciation drag they see not at all.

That it is human to think the other fellow is making more than you are is clearly shown in the attitude of the telephone companies themselves; that is, those operating local companies only and not interested in toll lines. They think the toll companies must be making money, and they know they are not being paid by the toll companies the amount which they are entitled to, for handling toll business.

Speaking of the state of affairs in Minnesota, where an agreement was entered into some months ago for an increase in the rate of compensation for handling the business: The arrangements as finally entered into specified a certain graduated rate, depending on the amount of the message. It was apparently satisfactory to most and was the best that could be secured by the locals anyhow.

On the other hand, certain other points in controversy were not settled and are still pending. At a meeting held recently in Minneapolis, these other matters were taken up and discussed with a view of securing for the locals what they deem is a more just schedule.

Matters discussed related to the amount of additional compensation that should be allowed locals at points where toll business was neither "center-operated" nor "center-checked," but where operators handled each message through to its destination and made out both ticket and a report at the end of the month. The compensation for such additional work was, of course, the subject of considerable dissention, and it was evident that the amount would vary greatly at different exchanges on account of the fact that no two offices were alike as to conditions and methods.

There is genius and power in persistence. It conquers all opposers; it gives confidence; it annihilates obstacles. Everybody believes in the determined man. People know that when he undertakes a thing, the battle is half won, for his rule is to accomplish whatever he sets out to do.—Orison Swett Marden.

In some cases, all the toll business is handled at the local company's switchboard by operators paid by and under the supervision and authority of the toll companies. These operators handled all the toll business for the local company and, in some cases, either "check" or "ring" for a toll area. In other cases, the operator merely rings through or relays messages passing through and does not make any tickets or a report.

Again the toll operator, in the employ of the toll company at a center-checking station, not only takes the ticket but does the passing of it and supervises the setting-up of the circuit. She makes a ticket, keeps a report of it and puts the call through when the parties are ready to talk, leaving the local operator nothing to do but to report the ticket in and to call her party when called party is ready on the line.

There is also a condition existing in some exchanges where a much larger number of in and reversed tickets are the rule than at some other points where outs and ins generally nearly balance in numbers. This condition is said by the representatives of the locals to call for a different amount of remuneration than at stations where a more nearly balanced condition exists on account of the extra amount of work to be done in setting up circuits for calls incoming from which they derive no revenue and which were not included in making out the commission report.

The schedule of commissions which has been allowed under the supervision of and by the consent of the Minnesota Railroad & Warehouse Commission was made on a basis of messages which were "center-operated" and "center-checked." The locals claim that where either of these conditions is lacking and where the extra work thus involved in each process is thrown onto the local operator, the local company should derive the revenue from it, which would amount to the cost of center-checking or center-operating or both.

Of course, as it is not advisable or profitable for all toll messages to be center-operated or center-checked, it is necessary to leave the handling of such messages in such toll areas to the local company's operators. Especially is this true in toll areas where the country is sparsely settled and business comparatively light.

The locals, however, claim that in such a case the commission allowed should be larger as so few messages are handled that there is no profit in keeping operators on work for the small amount of business done. The toll companies, on their part, might say with truth that the rate fixed per message is no greater in the sparsely-settled regions and, therefore, on short hauls which are so few in number, there is a direct loss over what would be the case where operators could handle hundreds of messages per day instead of only a few.

It was finally decided that the matter could only be settled by making a traffic study of each station where center-checking and center-operating were not in force and get an average cost which is incurred by the local company in handling the business and make the extra remuneration accordingly. This was a wise and the obvious course and, as the toll representatives agreed that the awards should be retroactive, the matter was left in that way with every prospect that a fair and reasonable settlement would ultimately be arrived at.

APHORISM—The other man is the luckiest until you find out.

What Is Your Company Doing?

Chats About Company's Doings.

By Stanley R. Edwards.

"We never can make friends unless we come in contact with people; and we never can come in contact with them unless we go at least half way to meet them," says the Southwestern Telephone News.

"A family can spend a lifetime right alongside the most charming people in the world, and never know it, unless they make a few calls. You have to get acquainted first, and then, if everybody is the right sort of folks, friendship is bound to result.

Now the Bell Telephone Family is living right alongside the great big Public Family. It has been for some time, and will continue so to live forevermore. Being such close neighbors, we all might be as neighborly as it is possible to be, and reap all the pleasure and benefit that neighborliness begets.

Heretofore, we have been doing most of the calling. Every day Southwestern employes make millions of calls on the Public Family, either by telephone or in person. But it's a pretty one-sided affair. The Public Family doesn't visit us nearly as much as we visit it. It's time that we begin to insist on our neighbors being a little more neighborly with us.

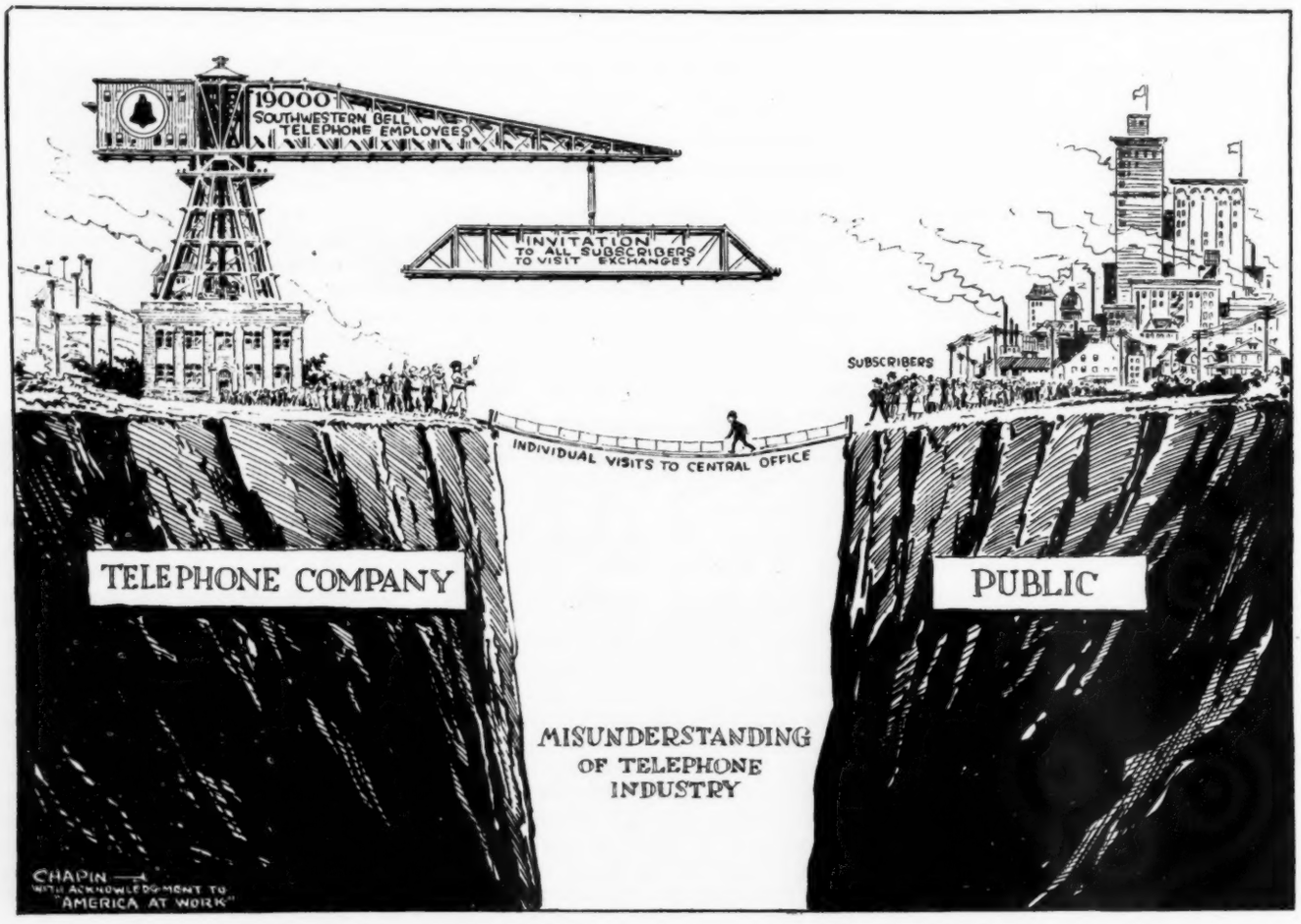
What we want to do is to make the Public Family realize that the big Bell mansion is keeping open-house all the time—that, as a matter of fact, the Bell mansion really belongs to the Public Family, and that they should drop in occasionally to see how all the folks are getting along.

If we can accomplish this, it will be difficult to tell which will benefit the more. Our problems, as telephone people, will become easier, and it is a certainty that the better the Public Family understands the inner workings and methods of telephone operation, the better service they can enable us to give them. At least, it is a mutual benefit proposition, with better telephone service as the certain end.

Now to accomplish this object of getting the Public Family into our telephone home, we don't want to get just one or two visitors to come in, and then drop the matter. We want to get them to come singly, or in twos, or in threes, or in great bunches, but no matter how they come, a steady flow of them. Naturally, if each of us employes gets one or two visitors a week, soon the total will have reached an astonishing figure. And this is one of the best ways, after all—for each of us to get one or two visitors a week.

A clever method of showing the public what happens in a central office is being used in some Southwestern cities. After due arrangements are made with the city authorities, and with their hearty co-operation, the public is invited to the central office. The visitors see the board in its normal condition.

Then the fire department turns in a fire alarm. Immediately after the alarm is sounded, the board, as is always the case, blazes up, and the operators are temporarily swamped with calls asking for the location of the fire. Then the point is made with the visitors that, while idle curiosity is being satisfied, many very urgent calls probably are going unan-



Graphic Presentation to Telephone Employes of Means for Improving the Public Relations of Telephone Companies.

swered—calls for the ambulance, or a doctor, or more fire apparatus, or from someone, who, unaware Central is being swamped by fire calls, can't understand why he can't get an answer.

The demonstration is very effective and the visitors depart with more kindly feelings toward the operators.

In some exchanges, high school classes are taken through the central office, and organizations such as the Chamber of Commerce or the Rotarians, are invited in to lunch at the cafeteria. Talented operators supply the entertainment at these gatherings.

There are a number of ways to get the public to call on us, but, as has been said before, the best way, and the most effective way, is for each of us to make it a part of our job to get our friends to pay us a visit.

Honestly, the more the public knows about our business, the easier it will be for us, individually and collectively, to give better telephone service. And that should be incentive enough to get our friends to come in and see us at work."

Getting the public to visit the exchange, to become acquainted with the operators and then to see the many details involved in the supplying of telephone service, has done much to improve the public relations of more than one company—and its service also.

In an address at one of the meetings of the Northeastern Indiana Telephone Association, Frank E. Bohn, general manager of the Home Telephone & Telegraph Co. of Fort Wayne, Ind., expressed some thoughts that every telephone man would do well to ponder.

Said Mr. Bohn:

"The telephone business is such an important link in the chain of commercial endeavor, and it is so vitally connected with the business welfare of every community throughout the country, that it should inspire those connected with it to the highest ideals in their endeavor to place their business on a par with every other business in their community.

And yet, it is safe to say that comparatively few telephone men realize, even at this day, the importance and dignity of the telephone business. So many telephone companies neglect to impress their fellow townspeople with the importance of their business in the community that they, in turn, look upon the telephone manager and exchange quarters as something inferior to other concerns, whose outward appearance is evidence of their prosperity and progressiveness.

There is no reason why the telephone exchange and office in any town should not compare favorably with the office and fittings of the banks, for instance. Instead of being tucked away on the second floor of some old rickety building, accessible only, in a great many places, over a not-too-clean stairway through some dark dingy hallways into an untidy office, to which the public and the subscribers are forced to go if they wish to make a long distance call or pay their bills, they should be located on the ground floor in respectable, clean quarters, easily accessible to the public and the subscribers and furnished in such a way as to be a credit to the community.

The manager of the telephone plant in any town should command the respect and esteem of his fellow townsmen in the same degree as the officials of a bank, and his personality should be such as to inspire them with confidence and respect toward the telephone business. The telephone business is certainly as important and of as much consequence as the banking business.

If the telephone manager will keep this in mind, if he will keep his house in order, so to speak, make his place of business inviting so that his subscribers are glad to visit him and do business with him, if he will furnish real telephone service, keep his outside construction and his apparatus in proper shape and of neat appearance, if he will see to it that the operators and other employes perform their work in an efficient and courteous manner, he is sure to succeed and gain a place in his community such as is enjoyed by the banker or any other business man of his community.

The telephone business is the greatest business on earth and its future prospects are the brightest. Its intimate relations with the public gives it a position of trust which requires considerable tact and personal ability on the part of the telephone manager and his employes to conduct it successfully."

The public service speakers bureau of the Illinois Committee on Public Utility Information is just completing a year of service in the industry.

In that time it established 82 local public service speakers' bureaus throughout the state of Illinois and has filled directly 85 assignments. There have probably been twice as many speeches made under local public service speakers' bureaus that the Chicago office has no record of. It has undoubtedly reached directly 15,000 people, and indirectly many times that number.

Even though the summer season is approaching, the bureau will be "on the job" to give service. "Let us know when you have your meetings and we will furnish the speakers," says a recent letter of the bureau which is addressed to managers of public utilities.

Frank D. Fancher, general manager of the Orange County Telephone Co., Middletown, N. Y., is a believer in continually hammering home the value of telephone service. In a recent letter to the editor of the local newspaper Mr. Fancher sets forth some excellent points as to the value of good telephone service.

Here is what he said:

"Editor Daily Herald:

"The quality of your telephone service is one of the most important things in your life.

There are very few things that will ruin a person's day as quickly as poor telephone service. The success or failure of an important business venture may depend upon the telephone service available.

You depend upon it in sickness and in health, in joy and sorrow, in case of fire or death. It will summon a doctor, a policeman, or a personal friend as the need may be. You get so used to quick, adequate, smooth-running service that you take it for granted.

But do you ever stop to think of the faithful operators who sit through the long hours of the night and watch for the little signal lights on the switchboard that your slightest desire to call may be gratified? Do you ever think of the men who face the storm that service shall not fail? Do you ever think of the great expense necessary to make such service possible?

Do you realize that it would be impossible to give you this invaluable service unless the telephone company serving you had a first class exchange with the very highest quality telephone instruments and thousands of dollars worth of delicate equipment. No matter how fine the equipment is, it is worthless without a competent force of highly-qualified, well-trained, contented employes to operate this equipment and keep it in the fine condition necessary to a high standard of efficiency.

It is absolutely impossible to employ the large number of experts and buy the necessary equipment to give the very best service unless the company is in a strong financial condition.

As the cost to you of your telephone service is so very low compared with the cost of other kinds of service, you can not afford to jeopardize this service for less than a cent a day, Mr. Residence Subscriber, or you, Mr. Business Subscriber, for a few cents a day.

We feel that our subscribers demand the highest quality service that we can possibly give them. We therefore strive to give the best possible service for a reasonable sum.

But we do not feel justified in economizing at the expense of the quality of our service.

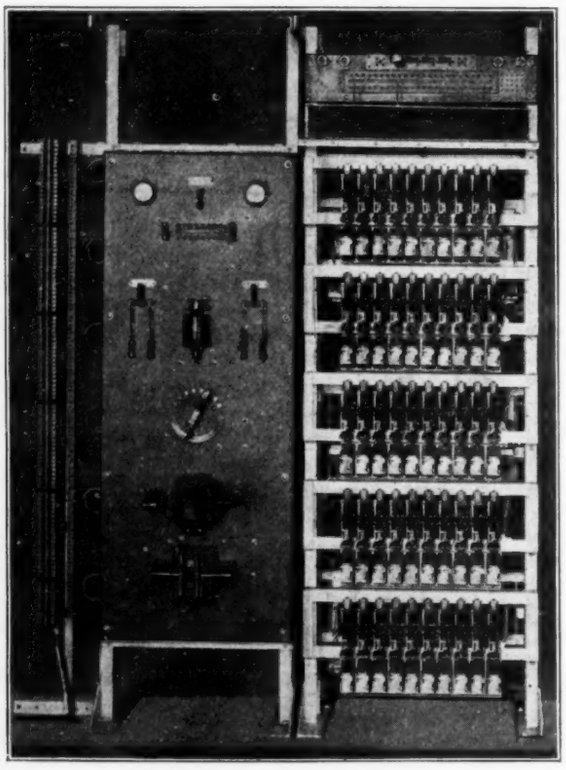
It is a poor man that is not worth his hire.

It is poor service that is not worth a fair price.

Frank D. Fancher."

The C. A. X. Ans

How can I give my S
24 hours a day, and



A 50-Line Community Automatic Exchange, fully equipped

The C. A. X. needs no operators, is practically self-maintaining, gives 24 hours first class service, and is so economical that it insures a fair profit.

Having foreseen the present widespre
matic Electric Company is in a position to
companies of every size.

Its greatly extended production facilit
service.

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The Bourse Bldg.

Columbus
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INTERNATIONAL TELEPHONE SALES

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Compagnie Francaise pour l'Exploitation des Procédés

sers the Question--

Subscribers first class service
and receive a fair profit?

What the C. A. X. will do for your small exchanges

Assure Adequate Profits—No operators' salaries to eat up returns.

Give First-class Continuous Service—The public support thus secured enables a company to secure rates that are sufficient to pay all fixed charges and leave a fair net profit.

Meet All Service Requirements—Including individual, party or rural line service, with harmonic, machine code, or push button code ringing.

Reduce Maintenance Expense—Any telephone man can keep the C.A.X. in working condition by short, infrequent visits.

prepared for Automatic telephone equipment, Auto-
to promptly and effectually the needs of telephone

prompt delivery of equipment for all types of

LECTRIC COMPANY

CHICAGO, ILLINOIS

Rochester 519 Arlington Bldg. | Detroit 525 Ford Bldg. | Pittsburgh 611 Lyceum Bldg. | Kansas City 1001 New York Life Bldg.

GINEERING CORPORATION, New York
Houston, Paris | Automatic Telephone Mfg. Co., Ltd., Liverpool | Automatic Telephones, Australasia, Ltd., Sydney

Commissions, Courts and Councils

Discussion and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchise, Rates and Service

Louisville, Ky., Company Wins Injunction—Must Give Bond.

An injunction restraining the city of Louisville, Ky., from interfering with the plan of the Louisville Home Telephone Co. to increase its schedule of telephone service charges, effective as of June 1, was granted the utility in a decision rendered by Judge Walter Evans in federal court on June 20.

The injunction order sustains every contention made by the Home company in the hearing recently conducted. The ruling requires the telephone company to give a reasonable bond in order to protect patrons of the company in the matter of a refund on the difference between the $6 monthly charge proposed by the company and the $5 rate fixed by the city, in the event the case finally should go against the company.

The decision also prevents the city from carrying out the terms of the one-year licensing ordinance passed by the general council last month.

Judge Evans held that the Frick case had no bearing on the issues before the federal court. The Frick case referred to was an injunction recently granted Robert J. Frick, a druggist, in the Jefferson Circuit Court to prevent his telephone bills from being increased.

The ruling being favorable, the telephone company will at once mail out bills for June with the increased rate charged. Bills have been held up by the company pending the ruling.

The city's Home telephone litigation grew out of the failure of the general council to offer for sale a franchise on the expiration of the Home company's 20-year franchise last March.

During the period of government control Postmaster General Burleson granted an increase in rates to the Home company and after the lines were returned to private ownership, the company asked for an increase in rates, which was refused by the general council. Then the Home company applied for higher rates in its new franchise which was to be awarded it this year.

It asked for rates based on a maximum of $6 a month for individual line business service and when the franchise was presented to the lower board of the general council for approval the rates were reduced by the board to a $5 scale. After a delay of several months an ordinance containing a still further reduction was passed by the board of aldermen.

This meant that the measure would have had to go into conference for some agreement, but before this happened the Home company announced that due to the failure of the "city fathers" to agree on a new franchise, it proposed to establish its $6 rate on June 1.

The city attorney's office then had introduced another ordinance, not a franchise, but a one year licensing measure which permitted the company to charge the $5 scale. It was explained by the mayor that the city refused the 20-year franchise on the ground that it would make difficult the consolidation of the two telephone companies, and that it was his purpose to bring about the merger if possible.

Two days after the general council passed the one-year ordinance, the telephone company filed suit in the federal court to prevent the city from interfering with the collection of higher rates and from enforcing the terms of the one-year ordinance.

Federal Judges Hear Tri-State and Northwestern Bell Cases.

Three federal judges on June 18 heard the applications of the Northwestern Bell Telephone Co. and the Tri-State Telephone & Telegraph Co. asking that a restraining order of Judge Wilbur F. Booth, taking from the Minnesota Railroad & Warehouse Commission the power to deny a temporary increase by these companies be sustained. The judges are Page Morris, Wilbur F. Booth, and W. H. Sanborn.

On February 6, 1921, the commission denied the companies the right to make temporary increases in rates until an investigation begun by the commission four years ago to place a valuation on the properties of the companies was completed. Figures are now being compiled by D. F. Jurgenson, engineer for the commission and engineers employed by Minneapolis, St. Paul and Duluth.

An order restraining the commission from holding the companies to the old rate was issued by Judge Booth soon after the commission's denial of the increase. Under the United States statute, however, a restraining order by one judge holds only until three federal judges can hear the case.

At the hearing, Assistant Attorney General Henry C. Flannery, arguing for the commission, declared that the Northwestern Bell company had had increases amounting to $3,000,000 between June 30, 1918, and the time of the issuance of the restraining order, while the total increases for the Tri-State company since June 30, 1919, have been $1,664,891 or 65 per cent.

One of the points of contention between the telephone companies and the commission is the matter of the depreciation of equipment. The companies contend that the yearly depreciation of the value of their plants amounts to about 5 per cent, while the commission contends that 2 1-2 per cent is sufficient.

One of the other points which Mr. Flannery stressed in his attack on the Northwestern Bell company was that its stock is owned by the American Telephone & Telegraph Co., which, he said, collects 4.29 per cent of the Northwestern company's earnings. Under its contract with the parent company, Mr. Flannery declared, the Northwestern company would pay $50,770.13 a year from the increases allowed by Judge Booth's restraining order.

The telephone companies contend that the commission is not basing its estimates on proper standards of value and has computed the value of their properties on prices lower than those at which they bought their materials. The commission contends, however, that the companies are basing their valuations on high war time prices and is, therefore, not setting a fair standard.

Hearing on Proposed Standards of Overhead Construction.

The California Railroad Commission has set July 15 for a hearing at San Francisco in the matter of the proposed uniform standards of overhead line construction applying throughout the state.

On the commission's initiative a tentative draft of the standards has been prepared, and power, telephone companies, and others interested are to be heard as to the reasonableness of the proposed order.

The standards include requirements of the present state laws and in general conform to the National Safety Code of the Bureau of Standards, adapted to California conditions. They are designed to increase efficiency and to give protection to workmen and to the public.

Higher Rates Throughout State to be Asked by Indiana Bell.

Increased telephone rates throughout the state of Indiana will be asked by the Indiana Bell Telephone Co. in the near future, it became known this week.

"The reason we have to ask for higher rates in several of the cities in which we operate is simply because we are running behind every day," said Frank Wampler,

vice president and general manager of the company. "We can not keep up our system or our service unless our customers pay a fair price for their telephones. If we run through another year at the present rates, we will be about $140,000 short of paying operating expenses. The operating costs are a little lower than during the war, but they are not low enough to enable us to continue business at the present rates."

Mr. Wampler said the company will need $2,071,000 in additional revenue for the fiscal year to end March 31, 1922, in order to pay the interest on its debts and pay a 7 per cent dividend on the $15,000,000 in stock. This does not include a surplus which, he says, is needed to extend and improve service.

Kansas Supreme Court Hears Bell Telephone Rate Case.

The Kansas Supreme Court on June 9, heard the appeal of the Southwestern Bell Telephone Co. from the Reno County District Court affecting an injunction against increased telephone rates for Hutchinson. The writ was issued by Judge Fairchild when the telephone company sought to enforce a new rate schedule.

Recently the Bell company secured a restraining order against the public utilities commission when it failed to pass on applications for rate increases in various Kansas towns. The former industrial court had granted the increased wages to employes in towns affected, but failed to act when the company asked for increased rates with which to meet the advance in operating costs. Then the Bell company enjoined the state commission against interference with the new rates.

Judge Fairchild enjoined enforcement of the new rates for Hutchinson. He declared the public utilities commission and industrial court had played politics in its rate-making action and denied to the company the right to advance its charges. The Bell company then appealed to the supreme court. A decision will probably be handed down sometime in July.

Connection Charges Established at Dodge Center, Minn.

In an order issued June 13 the Minnesota Railroad & Warehouse Commission granted permission to the Dodge Center Telephone Exchange Co., operating a local exchange in the village of Dodge Center, to establish service connection, move, and other miscellaneous charges. Here are the service connection charges approved by the commission:

	Business Stations.	Residence Stations.	Extension Stations.
Instrument not in place	$2.00	$1.50	$1.00
Instrument in place	No charge	No charge	No charge

Move charges and charges for changes in directory listings are the same as those allowed other Minnesota companies with like connection charges.

Patrons at Hector, Minn., Will Pay Higher Telephone Rates.

Patrons of the Hector Telephone Exchange Co., of Hector, Minn., will pay higher telephone rates after July 1 under a ruling of the state railroad and warehouse commission entered June 9 granting permission to the company to raise its rates as follows:

	Old.	New.
Individual line business.....	$2.25	$2.50
Individual line residence.....	1.25	1.50
Extension stations, business or residence	.50	.50
Rural multi-party, metallic circuit	1.25	1.50
Rural multi-party, grounded circuit	1.25	1.25
Extension bells	.15	.25

Desk set equipment on rural lines regular rate plus 25 cents additional.

Service connection and other miscellaneous charges were also approved. Here are the service connection charges:

	Business stations.	Residence stations.	Extension. stations.
Instrument not in place	$2.00	$1.50	$1.00
Instrument in place	1.50	1.00	No charge

The Hector Telephone Co. serves 584 stations. The town plant consists generally of aerial and underground cable construction, while practically all of the rural subscribers are served over grounded circuits.

Proposed Rate Increase Rejected—New Schedule to Be Filed.

An increase in rates from 50 to 75 cents per month was granted the Machens Westalton Telephone Co. for its Machens exchange by the Missouri Public Service Commission in an order issued June 1.

Higher rates than those allowed were asked by the company in its application, but the commission found, in checking over the company's statements, that its expenses were abnormally high for an exchange of its size. It is estimated that the new rates will yield a return of 5.2 per cent on the investment, after setting aside 6 per cent for a depreciation reserve.

The rates found reasonable by the commission, and which will become effective July 1, to remain in effect 13 months, compare with the old as follows:

Business, direct line.....	$2.50	$3.00
Business, four-party line.....	1.75	2.50
Business, extensions	.50	1.00
Residence party line.....	1.25	1.75

The company is incorporated with $10,000 capital stock. The exchange was built in 1910 or 1911 and all lines are metallic, furnishing a local battery service to 9 business subscribers in Machens and 216 residence subscribers in Machens and the surrounding country.

Local and Rural Telephone Rates Raised in Dodge, Minn.

On July 1 telephone rates of the Dodge Center Telephone Exchange Co., of Dodge, will be increased to the following schedule, under an order of the Minnesota Railroad & Warehouse Commission issued June 9. The old and new net monthly rates compare as follows:

	Old.	New.
Individual line business.....	$1.50	$2.25
Two-party line business....	1.25	2.00
Individual line residence.....	1.00	1.50
Two-party line residence....	....	1.25
Extension stations, business or residence	.50	.50
Rural multi-party, metallic circuit	1.00	1.50
Rural multi-party, grounded circuit	1.00	1.25
Lodges, halls and schools....	1.00	1.00
Extension bells	....	.25

The Dodge Center Telephone Exchange Co. furnishes service to approximately 171 town and 216 rural stations.

Proposed Schedule Excessive—Lower Rates Fixed.

Finding the proposed increase in rates by the Farmers Telephone Co. of Harrison County for its Ridgeway, Gilman City, Edinburg, Brimson, Bridgeport, and Bethany, Mo., exchanges to be excessive, the state public service commission issued an order on June 1 rejecting the proposed schedule and ordered the company to file the following monthly rates to become effective July 1:

Business direct line.....	$2.00
Business direct line (metallic)....	2.50
Residence direct line.....	1.40
Extension sets, business or residence	.50
Rural class A switching.....	.75
Rural class B service.....	1.40
Extra charge for desk set, business or residence	.25

The business direct line (metallic) rates and the class A switching (rural) rate apply to the Bethany exchange only.

Commission Finds Cozad, Neb., Telephone Case a Puzzling One.

The Nebraska State Railway Commission has had put up to it by stockholders of the Cozad Mutual Telephone Co. of Cozad, a question so puzzling that it has passed it on to the attorney general for advice.

The articles of incorporation of the company provide that amendments thereto may be made in the manner prescribed therein, which calls, among other things, for the approval of the amendments by the directors and a majority of the stockholders. The financial affairs of the com-

pany have not been prosperous, and as the bank was pressing it for payment of loans and the company needed money for extensions and betterments, the directors submitted a proposition to make an assessment on each share of stock. This was ratified by a majority of the stockholders.

A minority of the group, however, being farmers and unable to pay their assessment on the stock, have appealed to the state railway commission to prevent the loss that will follow to them if the company follows the usual and intended process of selling the stock upon which assessments are not paid. They insist that there exists no right in law or in equity by which their investment can thus be wiped out by a majority vote, and that if this be permitted a company can at any time "squeeze out" investors if a majority of the stockholders decide to levy an assessment.

They insist that the company has a right, under the law, to ask such rates of the commission as will enable it to properly solve its financial problems, and that an order authorizing rates yielding a proper return on the investment can include a provision that no dividends shall be paid until debts are paid, thus providing a fund to liquidate bills payable.

The articles of incorporation do not contain the usual clause that the stock shall be non-assessable, and the majority stockholders claim that this gives them the power to order an assessment. They say that such action cannot be arbitrarily taken, but that when the finances of the company are in a condition that calls for immediate action to maintain its solvency, an assessment is justified.

Two Companies Cited for Changing Rates Without Permission.

Two Nebraska telephone companies have been cited by the state railway commission to appear and show cause why they should not be penalized under the state law for changing their rate schedules without the permission of that body.

The Glenwood Telephone Co. officials are required to "tread the carpet" on July 8. It secured a rate increase on December 22, 1917, and these are still the legal rates. Recently it came to the attention of the commission that it had increased residence rates at its Guide Rock exchange from $1 to $1.50 a month without asking anybody about it. The officers said that they needed the money because the revenues were not sufficient.

The Farmers' Telephone Co., Fordyce, Cedar county, is the other culprit. About a year ago its officials appeared before the commission and asked its aid in getting both feet out of the financial slough. The investigation disclosed that the company's gross revenue did not cover its salary list, including operators and linemen, to say nothing of depreciation reserve or dividends.

The officers asked to be permitted to increase the rates to the following: Business, $2 a month; farm and residence, $1.40, and switching 50 cents. The commission found the rates to be justified by the finances of the company, and ordered the company to collect the rates specified. When the announcement appeared in the local papers the patrons declared they would not pay them, and that they would sooner do without them. Fordyce is in the same section of state where the Bloomfield strike is now on. The directors held a meeting and decided not to increase the farm and residence rates but to leave them at $1.25.

If the commission had been informed it would undoubtedly have permitted the company to lose money if it desired to do so, but not a word was said to the commission about it. The fact was not disclosed until an examiner of the commission dropped in to look over the books. These officials are required to appear on July 7.

Under the Nebraska law it is just as much an offense for a company to reduce rates without permission or authority of the commission as it is to increase them without such authorization. The penalty is $10,000, enough to wipe out the entire capital stock of either company. This is not the first time that Nebraska companies have failed to consult the commission, but it has never asked the courts to levy any fine, as investigation has disclosed that the violations were not willful, but rather through ignorance of the fact that the only legal rates are those the commission promulgates.

Southern Bell Will Raise Its Rates in North Carolina.

The North Carolina Corporation Commission on June 3 handed down its opinion in the petition of the Southern Bell Telephone Co., increasing the rate for residence telephones 25 cents and allowing a 10 per cent increase in the rate for business telephones, provided that the increase for business telephones shall not be less than 25 cents and not more than 50 cents. The new rates are effective as of June 1 in every North Carolina city in which the Southern Bell operates.

While the rates of the smaller exchanges are raised 12 1-2 per cent, those of the larger exchanges will be raised on an average of 7 1-2 per cent and the business rates all the way through 10 per cent.

Permission is also granted the company to discontinue free service between Gibson and Laurinburg, Hamlet and Gibson, Rockingham and Hamlet, Salisbury and Cleveland, Smithfield and Selma, and Wilmington and Wrightsville beach.

The opinion is voluminous and goes into detail dealing with the relations between the American Telephone & Telegraph Co. and the Southern Bell company.

A dissenting opinion has been filed by Chairman W. T. Lee of the commission, who does not think that the increase allowed is sufficient, in view of the showing made by the telephone company's witnesses at the long hearing. Mr. Lee goes into details as to his difference with the majority opinion but does not object to the contract between the Southern Bell and the parent company, which owns all of the stock of the Southern Bell company,. His interpretation of the facts and figures presented by the comparison also differ from those of the majority opinion.

Coupled with the majority opinion is the requirement that the company immediately begin to make connections and improve its service, which requirement is a part of the order.

Merger of Telephone Properties at Sandusky, Ohio, Approved.

In sanctioning the merger of the properties in Sandusky, Ohio on June 8, the state public utilities commission followed the precedent established in the Hillsboro case.

It approved the purchase of the Sandusky Home Telephone Co. by the Ohio Bell company, but ordered present rates continued until there is an opportunity to demonstrate the manner in which they will work.

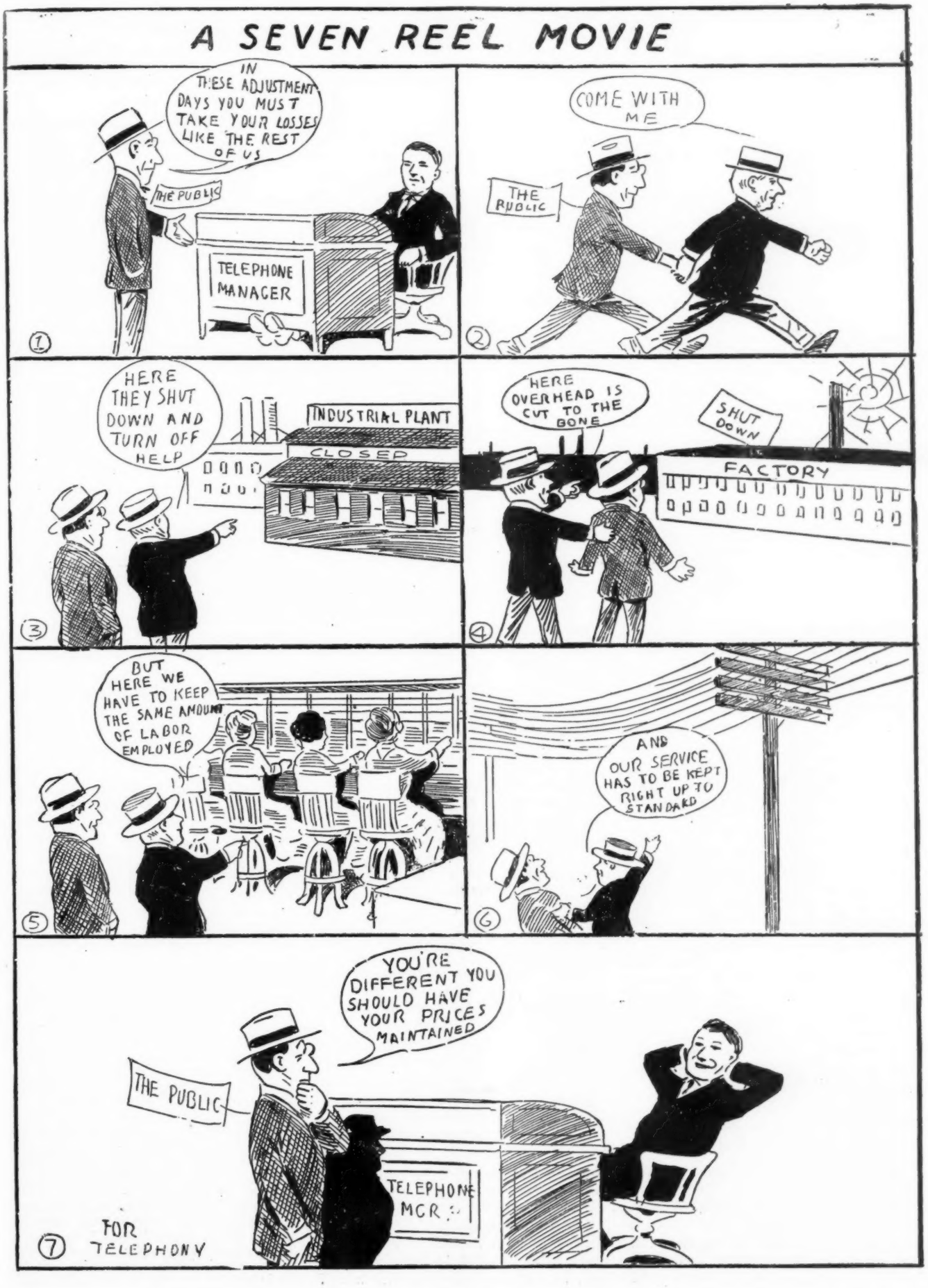
Fixes Rate for Two-Exchange Telephone Service.

On June 2 the South Dakota Railroad Commission issued an order on complaint of Clarence Chamberlain and George Moxon against the Dakota Central Telephone Co., requiring the company to furnish two-exchange to subscribers on its rural lines connecting with the cities of Colman, Egan and Flandreau, upon the payment of $1.50 per year per telephone in addition to the regular exchange rate of $1.25 per month.

The complainants also asked that the exchange rate be reduced to $12 per year when payment is made in advance, but this the commission refused to do, believing this rate to be reasonable.

Prior to the acquisition of the lines by the Dakota Central company, they were owned by the Moody County Telephone Co., at which time, the complainants stated, subscribers on rural lines, whether radiating from one or the other of said exchanges, were entitled to system service upon the payment of a specified monthly rental rate.

On January 1, 1921, the Dakota Central company notified subscribers that the privilege of securing unlimited system service would be discontinued and that in the future they would be entitled to communication by telephone with those


A SEVEN REEL MOVIE
IN THESE ADJUSTMENT DAYS YOU MUST TAKE YOUR LOSSES LIKE THE REST OF US
THE PUBLIC
TELEPHONE MANAGER
1
COME WITH ME
THE PUBLIC
2
HERE THEY SHUT DOWN AND TURN OFF HELP
INDUSTRIAL PLANT
CLOSED
3
HERE OVERHEAD IS CUT TO THE BONE
SHUT DOWN
FACTORY
4
BUT HERE WE HAVE TO KEEP THE SAME AMOUNT OF LABOR EMPLOYED
5
AND OUR SERVICE HAS TO BE KEPT RIGHT UP TO STANDARD
6
YOU'RE DIFFERENT YOU SHOULD HAVE YOUR PRICES MAINTAINED
THE PUBLIC
TELEPHONE MGR.
7
FOR TELEPHONY

subscribers attached to lines radiating from one exchange only. Where rural subscribers received interchange of service with subscribers on lines other than those directly connected with the same exchange, the regular toll rate between such exchange points, which is 10 cents for station-to-station calls and 20 cents for person-to-person calls, would be imposed.

The commission found that the rural party lines when originally constructed were located without any particular consideration being given to the needs or requirements of individual subscribers. Many subscribers residing in the trade territory of Flandreau, for instance, were attached to lines with connection at Egan only, so that the subscribers are in need of two-exchange service.

In its opinion, the commission states that to require subscribers to pay regular toll charges under the circumstances on this class of intercommunication would be unreasonable and that payment should be made on a basis which would afford the company reasonable compensation. In other cases the commission has held that a rate of 12 1-2 cents per month per telephone for lines connected with two exchanges is reasonable, and this opinion has been upheld by the supreme court. It was, therefore, so ordered in this case.

Charging for Installation of Desk Sets Ordered Discontinued.

In an order issued by the Wisconsin Railroad Commission on June 15, the Plymouth Telephone Co. was ordered to discontinue its practice of charging $2 for the installation of a desk telephone and its application for authority to make such a charge was denied.

It was further ordered that the company make no charge for installing telephones except such charges as were approved by the commission under date of March 18, 1920, which charges were filed in accordance with the provisions of the order of the commission dated March 5, 1920, which provided that installation charges should, under certain specified circumstances, be subject to refund.

This case arose from an application filed with the commission by the Almond Telephone Co. in which it sought to have authorized a charge of $2 for installing a desk telephone, this charge to be in addition to regular charges for installation and not to be subject to refund.

Wisconsin Company Authorized to Charge 10-Cent Toll Rate.

On June 7 the Wisconsin Railroad Commission granted permission to the Belmont & Pleasant View Telephone Co. to place in effect a toll rate of 10 cents for each message passing over any clear line between any of its exchanges or between any of its exchanges and an exchange of another company. In the latter case, the revenue from toll rates on messages is to be equally divided between the companies concerned. Toll rates on loaded lines were not granted by the commission.

The company is in need of additional revenue to meet the increased cost of conducting its business. The rates of the company are $12 per year for business telephones and $9 per year for residence telephones. These rates are applied only to the non-stockholders, and the other requirements of the company are met by assessments. There is a total of 445 subscribers, of whom 343 are stockholders.

Company Liable for Injury from Guy Wire.

A telephone company, constructing its lines along a street, under Acts La. 1880, No. 124, is without right to so place guy wires as to create an obstruction dangerous to one lawfully using the street.

Crossing a street at a place other than a regular crossing is not an unlawful use of the street. Cumberland Telephone & Telegraph Co. vs. Lawrence; U. S. Circuit Court of Appeals; 271 Federal, 85.

1920 Report Shows Deficit—Allowed to Increase Rates.

The Westboro Telephone Co. of Westboro, serving 148 subscribers, was given permission by the state railroad commission to increase its rates from $1 per month for all classes of service. The new rates, which became effective June 1, are as follows:

Business telephones	$2.00
Residence and party line telephones	1.50
Installation charge	3.00
Move charge	1.00

The 1920 report of the company shows a substantial deficit. The operating revenues were $1,614.12 and the operating expenses were $2,443.91 during 1920.

Statute Requiring Physical Connection of Telephones.

Though at common law such public utilities could not be required to make physicial connections of their telephone systems, the legislature or the railway commission may order such connections when public convenience and necessity require.

Such an order may be issued only if the company required to render the service will receive proper compensation for the additional service which it renders, and if such conditions are imposed as will protect the company in the individual management and control of its own property. The order must not create or allow of such discriminatory conditions as will cause injury to the company concerned.

The statute, requiring physical connections to be made between telephone companies (Rev. St. 1913, §§ 7414, 7417), applies to companies operating "trunk and toll" lines, and contemplates only the forwarding of messages when such lines are used. Blackledge vs. Farmers Independent Telephone Co.; Supreme Court of Nebraska; 181 Northwestern, 709.

License to String Telephone Wires Over Land.

One who has given a telephone company the license to erect its line on his land cannot revoke such license after the company has exercised the license and erected the line.

Where a vendee purchases property over which a telephone line has been constructed under a parol license from his vendor and the telephone line is open and visible, he purchases subject to the right of the telephone company to maintain such line and has no right to require removal of the telephone system.

A purchaser of land on which a telephone line had been built under a parol license from vendor took the property burdened only with the wires strung on land at time of the purchase and not with the additional burden of additional wires, regardless of what might have been in the contemplation of the parties at the time the license was originally given. Lashley Telephone Co. vs. Durbin; Court of Appeals of Kentucky; 228 Southwestern, 423.

Land Owner Can Compel Removal of Government Line.

Where a telephone company without authority ran its line over plaintiff's property, plaintiff may maintain an action to recover his property and compel the removal of the line, notwithstanding the fact that the government for temporary war purposes had taken control of telegraphs and telephones. The possession of the government does not afford any reason why the land owner should not have his rights adjudicated, particularly as he could not interfere with the government's possession, and at the time of trial the government had returned the property to private ownership. McPhillips vs. New York Telephone Co.; Supreme Court of New York; 187 N. Y. Supp., 183.

Summary of Commission Rulings and Schedule of Hearings.

ARKANSAS.

June 6: Hearing at Little Rock on application of the Berryville Telephone Co. for authority to increase rates on its farm lines from 25 to 50 cents a month.

CALIFORNIA.

June 11: Application filed by the Suisun & Green Valley Telephone Co. for permission to sell 130 shares of its capital stock at the par value of $50 a share.

June 11: Application filed by J. H. Richardson, prop. Richardson Springs, for authority to adjust interchange of service between the lines of the Pacific Telephone & Telegraph Co. and his privately-owned line between Chico and the Springs.

July 15: Hearing at San Francisco in the matter of proposed uniform standards of overhead line construction applying to power, telephone companies and other public utilities throughout the state.

June 17: Application filed by the San Ferando Telephone & Telegraph Co. for authority to issue and sell 100 shares of its common capital stock at $100 a share, the proceeds to be used in additions and extensions to plant.

June 17: Application filed by the Associated Telephone Co. for permission to revise farmer line and suburban telephone rates outside of the city limits of Long Beach and San Bernardino. The company states that the proposed revised schedule will not bring in any more revenue but is intended to correct discriminatory charges.

FLORIDA.

June 15: Hearing at Live Oak on petition of the Florida Telephone Co. for authority to increase its exchange rates affecting service through the exchanges at Branford, Live Oak, Mayo, O'Brien, and Wellborn.

ILLINOIS.

June 21: Hearing at Springfield on joint petition of the Illinois and Illinois Bell Telephone companies for an order approving purchase by the former and sale by the latter of telephone property in Jacksonville, Literberry, Alexander, Carrollton, Roodhouse, and White Hall; also for issuance by the Illinois company of $100,000 common stock and $10,300 first mortgage bonds and acquisition of stock by the Illinois Bell company.

June 22: Hearing at Springfield in the matter of proposed advance in rates for telephone service in Litchfield by the Litchfield Telephone Co.; application filed by the Litchfield company for a rehearing and for permission to place in effect as of March 1, 1921, the rates provided in its rate schedule IPUC 4 filed with the commission.

June 22: Hearing at Springfield on application of the Grafton Telephone Co. for authority to charge certain toll rates between Grafton and Brussels.

June 23: Hearing at Springfield on complaint of W. A. Turnipseed against the Fifer Telephone Co. alleging that the company increased rates for service in Gridley without the approval of the commission.

June 23: Hearing at Springfield on complaint of the Gridley Telephone Co. against the Fifer, the Independent, the Northwestern, the Fair View, the Buck Creek, the Waldo Central, and the Waldo Telephone companies alleging invasion of territory and extensions without a certificate of convenience and necessity.

June 23: Hearing at Springfield in the matter of application of B. F. Vancuren and the Vancuren Telephone Co. for approval of sale by the former and purchase by the latter of telephone property in Hammond; set for hearing for purpose of receiving evidence from company that will permit of establishing non-discriminatory rates.

June 24: Hearing at Springfield in the matter of application of the Crescent Telephone Co. for authority to increase rates in Hillsdale, Erie, and Port Byron; set for hearing for purpose of receiving exhibits of engineering section and to allow interested parties to cross examine engineers.

KANSAS.

July 29: Hearing at Topeka in the matter of revision of toll rates, with special reference to the commission paid local companies for handling toll and long distance calls, postponed from May 23 to this date.

MICHIGAN.

June: Petition filed by C. E. Tarte, general manager of the Citizens Telephone Co., for permission to charge 10 per cent additional on bills not paid before the 15th of the month for which service is rendered.

MINNESOTA.

June 13: The Dodge Center Telephone Exchange Co., of Dodge, authorized to establish service connection, move, and other miscellaneous charges.

MISSOURI.

June 3: The Ludlow Telephone Exchange, of Ludlow, authorized to continue in effect present schedule of rates indefinitely, effective July 1.

June 6: Order issued suspending until October 3 proposed advance in rates for the Osceola Telephone Co., of Osceola.

June 6: Authority granted Calvin Eaton to sell and J. W. Bryant to purchase the Leadwood Telephone Co., of Leadwood.

June 9: Complaint of Clarence H. Venner against the Southwestern Bell, the American Telephone & Telegraph, and the Kansas City Telephone companies dismissed for want of prosecution.

June 15: Authority granted the Meissner Telephone Co. to sell and the Commercial Telephone to purchase all the property and assets of the former company in Jefferson and St. Louis counties. The Commercial company was also authorized to issue the unissued balance of its authorized capital stock amounting to $11,200

NEBRASKA.

June 14: In the matter of application of the Dawson County Mutual Telephone Co. for permission to establish rates for non-subscribers: dismissed for want of prosecution.

June 14: In the matter of application of the Citizens' Telephone Co., of Minatare, for permission to make a monthly assessment of $2 upon all subscribers; dismissed for want of prosecution.

June 14: Objections filed by sundry stockholders of the Cozad Telephone Co., alleging that directors have exceeded authority in levying an assessment upon all stockholders for the purpose of paying debts and making improvements and betterments.

June 15: In the matter of application of the Davenport & Kiowa Telephone Co. for permission to establish a rate for business service on farm lines; dismissed for want of prosecution.

June 15: In the matter of application of the Cambridge-Holbrook Mutual Co. for permission to make certain increases in rates; dismissed for failure to prosecute.

June 15: In the matter of application of the Ponca Valley Telephone Co. for permission to make a non-subscriber's rate; dismissed for want of prosecution.

June 16: It appearing to the commission that the Glenwood Telephone Co. has increased rates at its Guide Rock exchange from $1 to $1.50 a month without authority of the commission; ordered that it be cited to appear on July 8 and show cause why its violation of the statutes should not be reported to the district court of Webster county for prosecution.

June 16: Complaint filed by Ed Stadler and Oscar Lambert, of Kearney county, against the Northwestern Bell Telephone Co., alleging refusal to furnish rural service from line located two miles from complainants' farms. The farmers live 11 miles from Minden, their market town, and desire communication. The company pleads high cost of material and construction as not warranting investment necessary.

June 16: Application filed by the Northwestern Bell Telephone Co. for permission to discontinue service to parties at the end of a rural line extending from McCook to Indianola, a company at the latter town giving adequate service.

June 16: Information being lodged with the commission that the Farmers' Mutual Telephone Co., of Fordyce, is charging a lower rate for residence and farm service than that fixed by the commission upon the application and showing of the company, it is ordered that officers of the company be cited to appear on July 7 to show cause why they should not be proceeded against in the courts of Cedar county for violation of the statutes making rates fixed by this commission as the only legal rates in the state.

June 17: Complaint filed by the Paxton Commercial Club against the Citizens' Telephone Co., of Paxton, alleging inefficient and inadequate service.

June 17: Complaint filed by the Burlington Railroad against the Hooper Telephone Co., alleging that the telephone company has not allowed for proper clearance of wires at railroad crossing.

June 18: Application filed by the Lincoln Telephone & Telegraph Co. for permission to continue to charge the present schedule of rates expiring by limitation on July 1 and to increase toll charges for distances exceeding 40 miles to equalize them with the rates asked for by the Northwestern Bell Telephone Co. in its pending application.

NEW YORK.

June 17: Complaint filed by the Jamestown Chamber of Commerce and Mayor Carlson of Jamestown asking for an investigation of existing and rates proposed as effective on July 3 by the Jamestown Telephone Corp. and suspension of the rates in Jamestown. The complainants refer to various proceedings between the company and the city authorities and the complaint asks for a consideration of the segregation of the Jamestown telephone service, alleging that the Jamestown service area extending outside of the city causes an undue burden on Jamestown users in the maintenance of service along the shores of Chautauqua Lake.

NORTH CAROLINA.

June 9: Petition filed by the Southern Bell Telephone Co. asking the commission to rehear the rate case on July 25 in order that it may offer additional evidence and testimony showing that the rates allowed in a recent decision are insufficient.

NORTH DAKOTA.

June 23: Hearing at Cooperstown on application of the Griggs Co. Co-operative Telephone Co. for authority to increase rates.

OHIO.

June 28: Hearing at Columbus on application of the Ohio Bell Telephone Co. for authority to increase its residence rates postponed from June 7 to this date.

WISCONSIN.

June 15: The Plymouth Telephone Co. ordered to discontinue its practice of charging $2 for the installation of a desk telephone.

June 21: Hearing at Madison on application of the Mondovi Telephone Co., of Mondovi, for increased rates.

June 21: Hearing at Madison on application of the Home Telephone Co., of Durand, for authority to increase its rates for telephone service. U-2524.

Telephone News From Across the Seas

News and Comments on British Telephone Rates and Service—Railway Companies Charging Higher Rates for Calls Made from Station Call Boxes—Statistics as to England's Telephones and Plans of Development

By Jack Brooks

A scheme whereby extra profit can be squeezed from the telephone service is being put into practice by the railway companies in England, much to the surprise of the harassed taxpayer. The railway companies are charging an extra two cents for a call within the 10-mile metropolitan radius where a railway station call box is used. The rate at the telephone call box outside a railway station is six cents for the ordinary local telephone call. Inside the stations it is eight cents. In other words, the railway companies have decided they are entitled to "middlemen's profits."

Apparently this matter of telephone rate profiteering is of no concern to the government, which operates the British telephone system. The postmaster-general, under his arrangement with the railway companies, only satisfies himself that the companies do not under-cut the general call box rate. So long as they do not under-cut they may overcharge as much as they please for as long as the telephone user will stand for it.

Roughly, the railway companies act as middlemen for the post office telephone service. The companies give a great deal of business to the post office through their many call boxes to be found at every railway depot in the country (although this does not mean to say that the boxes are always in working order). And the companies believe in taking the usual middlemen's profits at the expense of the subscriber.

The railway companies get around the imputation of profiteering by contending that their telephone call boxes are not public boxes at all. In other words, they belong to the railway companies, since all telephone calls made from these station boxes go through the railway company's exchange to the post office. The railway companies, it seems, have to pay the post office for the right to be linked up with the general system, and they also pay a message rate for each call.

Of course, until the recently revised telephone tariff (under which British telephoning is more expensive than two weeks at Atlantic City or a month in Florida) came into effect, the message rate at the railway depot call box was the same as at any other call box provided by the post office telephone service. Actually until now no one ever thought, when telephoning from the station boxes, that he was dealing with the railway company and not the post office direct. An extra two cents on the minimum message rate of six cents is, however, considered by subscribers to be excessive.

When it was pointed out to railway directors that the "tube" (underground) stations were still providing telephone boxes at the regular rate (six cents) they retaliated that these boxes are linked up direct with the post office.

It is being suggested to the House of Commons telephones committee that a great reduction in telephonic working costs could be effected if a system of local telephone control was adopted in the country. Instead of being directed from London, local telephone services should be managed and controlled locally, according to telephone experts. The trunk (long distance) services would still be controlled by the post office.

W. Brownhill Smith, of the Glasgow corporation, in giving evidence before the telephones committee said there would be a greater inducement for economy than is now evinced in the service, and working costs could be materially lowered. Members of local telephone authorities would be elected every three years and would be in close touch with subscribers.

According to the Glasgow corporation, the new telephone rates are much higher than is at all necessary. If $26.25 a year for unlimited service paid all working charges, interest, sinking fund, and depreciation on the capital cost of the telephone system during 1901 to 1906, not more than a 50 per cent increase, the corporation thinks, should be imposed.

Local authorities should be given the chance, according to the Glasgow corporation, to buy local telephone services at cost price, less depreciation, if they so desired. If, as had been suggested, the postmaster-general was prepared to transfer the working of the Isle of Man telephones to the Manx parliament, the corporation thought similar privileges ought to be extended to local authorities in the United Kingdom. The corporation produced figures to show that before the new charges were introduced, it paid $27,500 a year for telephones for all departments. The sum now payable by the Glasgow corporation for its departmental telephones is estimated at $65,000 a year.

Dan Cupid is playing up so vigorously with the Japanese telephone operators that the telephone department of that country is at its wits' end to know what to do to maintain the efficiency of the service.

It seems that every so often a period of mating arrives, when the call of Cupid, if not obeyed, lessens the Japanese girl's chances of marriage. One of these periods recently arrived, evidently, and "hello girls" in the swarms gave up the plug and switchboard for the frying pan and vacuum cleaner.

In reply to questions, the British assistant postmaster general recently said that about 9,800 telephone subscribers had given notice to terminate their agreements during the four months ended March, 1921. As nearly as could be ascertained, about 3,000 of those notices were the result of the increased charges.

The total number of telephones in service at December 31, 1920, in the United Kingdom was 988,500, and in the United States approximately 13,500,000. The ratio of telephones to population was one telephone to every 47 inhabitants in the United Kingdom, and one to every eight inhabitants in the United States.

According to Sir Wm. Noble, engineer-in-chief to the post office, about £10,000 per annum is spent on telephone research work, but in America the telegraph and telephone companies spent £1,000,000 a year on such work. Automatic stations were working satisfactorily; at present they had 15 such stations established in which four different systems were working, and a fifth would be tried shortly. Of the four systems, one was less satisfactory than the others, and would not be used again. Up to the outbreak of the war the automatic system had not proved more economical than the manual system, but with the increase in operators' wages it would prove more economical.

"Bookmakers are apparently the only people who appreciate the facilities offered by the post office for letters to be dictated by telephone," said J. Scott, the Birmingham postmaster, addressing the local Rotary Club recently. Thirty words could be taken down at the head office, the Government providing the paper, and the caller only had to pay for the stamp.

A Welcome Visitor.

A letter from the Ansley (Neb.) Telephone Co., dated June 7, says:

"Enclosed find check for which please send 'Telephony' another year. I wish to say to you that 'Telephony' has been of great help to us. We watch for its coming every week.

Very truly yours,
R. J. Marshall,
Secretary and Manager."

From Factory and Salesroom

Greater Speed and Accuracy for "Information"

Recently B. E. Sunny, president of the Illinois Bell Telephone Co., pointed with pride to the company's record in Chicago, where in April 96 per cent of the connections that could be completed were completed without error. Such a record constitutes real service, of which any organization may be justly proud.

Service is the "stock in trade" of the telephone companies—it is their merchandise, and while invisible, nevertheless it possesses a quality that is easily definable. Complaints are the test-meter by which the quality of telephone service is measured. Close observation will reveal seasonal influence upon the prevalance of complaints, and their origin.

The migratory character of our urban population has frequently been made the subject of jesting comment by the daily press; its existence cannot be denied. Statistical records in large cities show that every family moves about every other year. In April there were 27,100 telephone moves made in Chicago and in the first half of May 40,700 move orders were completed by the company.

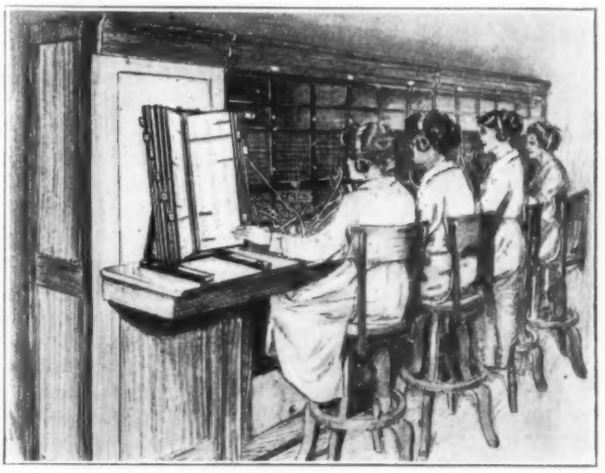
During the spring and fall moving seasons, many telephone numbers are changed, and until new directories are issued, the "Information" wires are taxed to their capacity with inquiries about new subscribers, changes, etc. Subscribers do not realize the difficulties encountered in keeping the information index up-to-date. Often when the operator is unable to give the number of a new subscriber, the caller places blame for inefficiency on the poor operator. In reality, the fault lies with inaccessible or incomplete records.

Different methods are employed by telephone companies with reference to the recording of new subscribers, or changes of numbers. Some organizations publish daily bulletin sheets, which are furnished the information operator; others issue index cards for every new subscriber, and these are filed in box drawers placed within convenient reach of the information operator.

With the first method, the information operator must search through several sheets for the name wanted — that takes time, and she should not be blamed if in her desire not to keep the caller waiting too long, she overlooks a name while hurriedly scanning the bulletin sheets.

With the second method it means hunting through box files for the card wanted; it may be misfiled. Again her fingers in fumbling the cards, which sometimes stick together, may pass over the right card time and again without noticing it. The result in either case is service complaints.

A new method has been developed that will eliminate the cause for many complaints, because it brings visibly before the information operators' eyes the name of every subscriber in proper order. The Acme Card System Co. is manufacturing a visible switchboard index which is said to enable the information operator to locate any one of thousands of names instantly and to give accurate information about new subscribers, changes, etc., quickly and correctly.



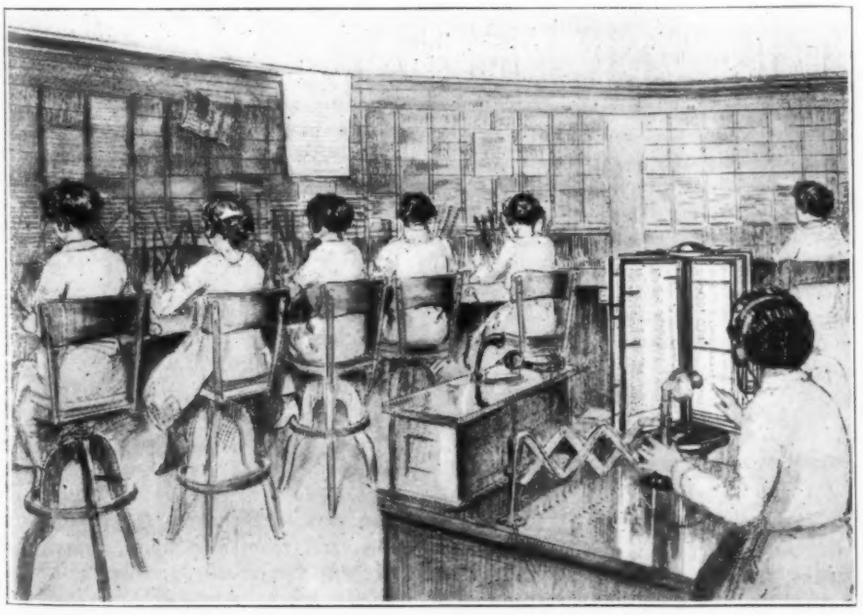
The Acme Visible Index Located at End of Switchboard.

On the Acme switchboard index each name is independent of the other and can be taken out and moved about easily. New names are put in where they belong, keeping the alphabet perfect and clearing the list of obsolete names.

The name strips are contained in transparent holders that protect them from dust and handling. The holders are arranged on metal frames which fit into the various types of metal stands.

In some exchanges it is customary to divert information calls to one end of the switchboard and then the Acme index is either placed on the board in an oblique stand or arranged on wall bracket, according to convenience, where the operator handling information calls can make quick reference and answer all inquiries instantly. Where information calls are handled by the chief operator, or where a separate switchboard is provided for information calls, usually a revolving stand is used.

The name holders are furnished in a variety of colors so that "private switchboards," "two-party lines," "four-party lines" and "individual lines" may be indicated. For temporary conditions such as "new subscriber," "out of order," "out of service," etc., colored signals are used which slip into the holders and are easily removed; such information, instantly obtained, also is of great value to the supervisor wire chief.



The Chief Operator May Act as "Information" Using the Acme Index.

It has been found that an Acme switchboard index saves four-fifths of the operators' time in connection with every information call and improves service to subscribers just that much. Names are added as soon as service is installed, keeping the list up-to-the-minute at all times.

The Acme Card System Co., 4 N. Michigan Ave., will be glad of an opportunity to give detailed information with reference to its new Visible switchboard index. Unqualified endorsement has been expressed by the telephone companies which have used the system, and it is claimed that its general adoption in central offices will be greatly appreciated by the public and will further demonstrate the constant desire on the part of the company using the system, to improve its service.

New Type Brach Vacuum Arresters Easily Installed.

The history of lightning protection dates back practically to the history of the practical electrical art or the transmission of electrical currents through conductors. Benjamin Franklin, when , he proved the identity of lightning and electricity the same, did it by establishing a means or path for the lightning to pass from the clouds to a kite, and from this kite down a string to a key.

The establishment of a conductive medium for lightning from a wire to the

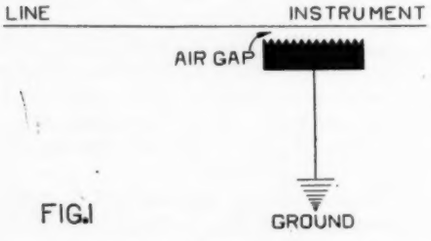


FIG.1

earth, is the basis of a practical application of a lightning protector. In other words, a lightning protector is simply a safety valve to establish an outlet for abnormal voltage from an electrical wire or conductor at some pre-determined place on the circuit.

Protectors are designed according to the normal operating voltages of the line, with a view that should an abnormal voltage be impressed on this line from any source, whether it be lightning, induction or crosses with a higher potential circuit, this current would have a ready outlet to the earth. Two things are desired in the proper design of protector.

First, that the normal voltage impressed on the line should be completely dissipated through the arrester into the earth without dividing or permitting the part of the current to pass into the operating instruments.

Second, that the protector, in so dissipating this current, shall not itself become damaged or have any of its parts affected by the passing of the current.

Various forms of mediums have been employed in arrester designs. The principal ones have been the air-gap, vacuum, non-air-gap (high resistance conductors) and electrolytic. The air-gap principle

THICKNESS OF THIS LINE INDICATES THE WIDTH OF AIR GAP OF AN ARRESTER THAT WILL FUNCTION AT 500 VOLTS AND MEET THE REQUIREMENTS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS.

FIG.2

has been most widely employed in protectors designed for telephone circuits. It features principally, conductors mounted on insulating base having the ground conductor in close proximity to the line conductor with an air-gap intervening, as illustrated in Fig. 1. The closer that the air-gap could be maintained, the more sensitive the arrester.

Practice, however, has determined that we are limited in reducing air-gap space on account of endeavoring to maintain a high normal line insulation after the passing of discharges. While improvements have been made by the employment of less fusable carbons or metals, still it has been found in telephone practice, that the necessarily small size of air-gap still causes crosses or partial grounds to occur frequently.

The importance of an arrester functioning below 500 volts is not alone to meet the prescribed requirements of the National Board of Fire Underwriters, but because these requirements were formulated for the purpose of offering a safeguard to telephone users from crosses with trolley, lighting or power circuits of 500 volts or higher. To appreciate the length of air-gap necessary to affect a proper function in accordance with these requirements, it would be necessary to have this air-gap approximately 0.004 inch wide, or as indicated in Fig. 2.

The vacuum principle of protection is based on electrical currents passing more readily through thin air, or gases at low pressures, than through normal atmosphere, as indicated in Fig 3. The L. S. Brach Mfg. Co. started experimenting a number of years ago, in order to apply the vacuum principle to the practical protection of low voltage circuits from lightning, believing that by being able to increase the actual gap between the elec-

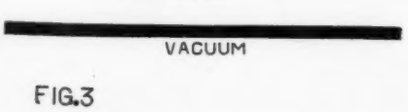


FIG.3

trodes and preserving a small air-gap equivalent for high voltage currents and static, it would not alone be able to function below the 500-volt limit with a spacing far in excess of the air-gap spacing, but be able to maintain a higher line resistance.

As a result, practical non-grounding arresters were developed. The company was not alone able to meet the required specifications of the National Board of Fire Underwriters, but went still further and has been able to produce an arrester sufficiently sensitive to shunt 0.001 of an inch in air by a vacuum gap of 67 times that spacing, as shown in Fig. 4.

It was found in the Brach vacuum arrester that many other valuable features were gained. Noticeably clearer transmission, a reduction in the number of fuse burn-outs, and a constant drain for static, together with the advantages of having the discharge take place in a sealed chamber, avoiding danger of igniting gases or becoming affected by moisture, corrosion, insects or handling.

The vacuum arrester that was placed upon the market came in instant demand and general use among the railway signal, telegraph, fire, police and other important circuits. Its entrance into the telephone field was necessarily slow, owing to the high cost of production, and that the standard designs on the market

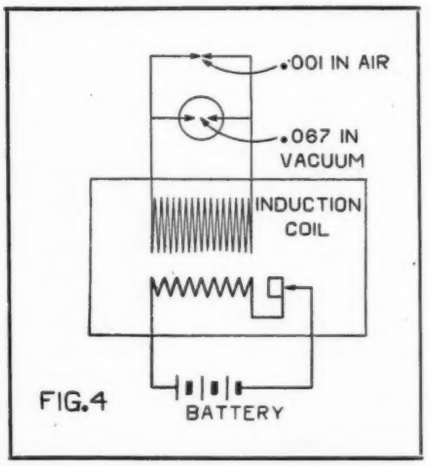


FIG.4

were cumbersome and not readily applicable to universal telephone use.

The Brach company's engineers, recognizing the valuable opportunities which this principle of protection afforded, but realizing that the instrument itself required much needed modification, devoted their energies to a series of developments and changes in designs, which included enlarging the research laboratory, and the engagement of trained specialists.

The results have been gratifying by the production of a new type of vacuum arrester interchangeable with a very large amount of the present telephone equipment. This type of cartridge is protected from discharges by a mica shield internally, and from mechanical injury by a fibre shield externally, and will now withstand repeated heavy discharges and reasonably rough handling without dangers of losses.

Are You Receiving the Monthly Belden Bulletin?

A monthly net price list bulletin is being issued by the Belden Mfg. Co. to assist its customers in setting prices and estimating jobs. The company has for 18 years been manufacturing electrical wires and cables.

"There are no discounts, lists, base prices or differentials to fuss with," says the company. "One of our customers has said, 'This net price list is "My Business Bible" so far as wire is concerned.' We hope our other customers will regard it the same way."

With the bulletin an order blank is enclosed.

Among the products described and listed in the bulletin are twisted lamp cord, flexible fixture wire, portable cord, heater cord, rubber-covered wires and friction tape.

If customers are not listed in Dun's or Bradstreet's books of credit rating, the Belden company will send goods C. O. D. or a 1 per cent discount on rubber-covered wire and lamp cords (1-2 per cent discount on friction tape) may be deducted and a cash remittance sent.

If you have not already received Belden Bulletin No. 1, send in your name and address to the Belden Mfg. Co., 23d St. and Western Ave., Chicago, and benefit by this valuable service.

You Can Make the Old Exchange "Blossom" with a Spragun.

George Brixton, wire chief of the Bridgeville Exchange, looked around the four walls of the room in disgust.

"Pretty rotten," he mumbled. "Paint skinned off the woodwork — furniture banged up—walls dirty. Some place!"

"What's the matter, George?" asked the manager, stepping to the door of the adjoining office.

"Oh, nothing much. I was just thinking out loud. We're having housecleaning at

"He Had a Little Contrivance Like a Gun."

my place, and beside all the spick and span paint up there——" he paused and waved his hand at the smoked ceiling.

"You're right, boy—it's pretty battered up," said the manager, looking about. "Needs paint. We might get a crew of decorators in here."

"No. We don't need a crew," said George. He seated himself on a corner of his desk and swung a foot to and fro. "I was walking past the Home Drygoods Co., down Main street, the other day, and the cleaners were in there, so I stopped and looked in."

"Huh! Must have been thinking about a cleanup for some time," observed the manager, dryly.

George grinned. "I was. A fellow in the store there was painting up the place. He had a little contrivance like a gun and was spraying paint around on every spot that needed it. The side walls measured about 40 square feet. Well, in 30 seconds—I timed him—he had given those walls the equal of two coats of paint that it took me hours at home to put on with a brush."

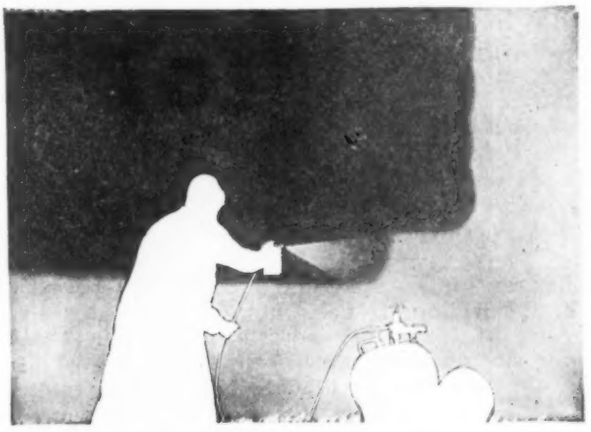
"I just stood there and watched—and the more I stood, the more interested I got. There was some old furniture in there—banged up like this we've got. In three minutes, the fellow had sprayed a coat of paint over it with the little contrivance I spoke of, and when I left the old chair was standing on the floor wet and shiny, but looking like it had taken a new lease on life."

"Say, that must be some little device. What was it, anyway? Did you find out?" asked the manager, with interest.

"You bet. It's called the Matthews Automatic Spragun and is made by W. N. Matthews & Bro., Inc., in St. Louis. You can get it in two styles. One 'gun,' the volume type, is designed for general painting service in industrial and manufacturing plants and for painting large areas, and house painting, and the other is a jar type for use in plants where frequent changes of paint are required. That jar type is a metal paint jar with a removable cap for cleaning purposes. The cap is threaded to fit the regular Mason glass jar. You can use a glass jar if you want to instead of a metal one.

"The fellow up there that was using it said one skilled painter using the first style that I spoke of can do the work of from five to twelve men working with brushes, and believe me, he's right, from the way he demonstrated the action of the thing.

"He said you can cover rough, uneven surfaces with the same speed and



"In 30 Seconds the Walls Were Given Two Coats of Paint."

thoroughness that you can flat surfaces. And he says it will apply a lighter or heavier coat than can be put on with a brush. The entire coat, he claims, is absolutely the same—uniform, I mean, and free from brush marks. One reason the Spragun is so good is because it is blown into the fiber of the wood or pores of the surface, and you know when you put paint on by hand you have to brush it in pretty well to get results.

"And that old chair I spoke of that they were repainting down there had as many scales on it as a fish. With the Spragun, the paint was forced into the openings and under the little scales and completely sealed up the surface with a smooth, even coat.

"The gun wasn't complicated at all. Mighty simple. Looks something like a revolver with tubes attached. You can balance it on the fore-finger by releasing your hold on the handle. The supply of air to be used comes through the handle and the paint comes through an opening directly under the fluid chamber of the 'gun.' The air and paint mix at the point of the nozzle. To increase or decrease the volume of paint to be sprayed there is a simple adjustment.

"And the best part of it is, the 'gun' doesn't cost much to operate. It works under low pressure and you can make the change from one color to another in a few seconds. How's that for a speech?" concluded the wire chief, with a grin.

"Say, George," said the manager, waxing enthusiastic, "let's get one of those things in there—those Spraguns. We can work it easy. I want my office done, too. Walls and all. I'll spray paint all over that old desk of mine, and chairs. Where d'you buy one? Where's my hat?"

A Splendid Booklet on Central Office Protection.

The Cook Electric Co. Chicago, has just issued a "classy" booklet of pocket size entitled "Central Office Protection."

It is not purely a technical analysis of central office protection, but presents the subject in clear, simple language, using some very striking photographs to illustrate the various points.

Both interesting and educational, it is a booklet that every telephone manager should carefuly read and pass on to his employes. It will help to make better employes and better service.

The Cook company has additional copies and will be glad to furnish them to anyone writing for them. Its address is 900 W. Van Buren St., Chicago.

Changes in Organization of Federal Telephone & Telegraph Co.

Alfred H. Dyson, who during the past six months represented the Federal Telephone & Telegraph Co., of Buffalo, N. Y., in its New York office as foreign manager, has moved his office to the factory office, in Buffalo, from which point the foreign trade of the Federal company will be carried on as heretofore.

Mr. Dyson is well and favorably known in the Independent telephone field and just previous to his association with the Federal company he was associated with the Western Electric Co. in its New York office.

Renville H. McMann of New York City, who is a member of the executive radio council of the second district and secretary of the Radio Club of America, has been appointed manager of the radio department of the Federal Telephone & Telegraph Co. of Buffalo.

Mr. McMann has been interested in amateur radio for the past 12 years and has had a broad experience in the wireless art, particularly from the viewpoint of the amateur.

During the war he was in charge of radio telephony on the destroyer U. S. S. Herresoff and also for three months had charge of the installation and maintenance of radio telephony at the United States naval air station, Cocosolo, Canal Zone.

The Federal company also announces the appointment of E. R. Corwin to its engineering staff. Mr. Corwin until recently owned the Corwin Electric Co. of Lafayette, Ind. This company was recently sold to the Federal Telephone & Telegraph Co. and moved to its Buffalo plant. Mr. Corwin has had a broad telephone experience over a great many years in the independent telephone field and will be a valuable addition to the Federal company's engineering staff.

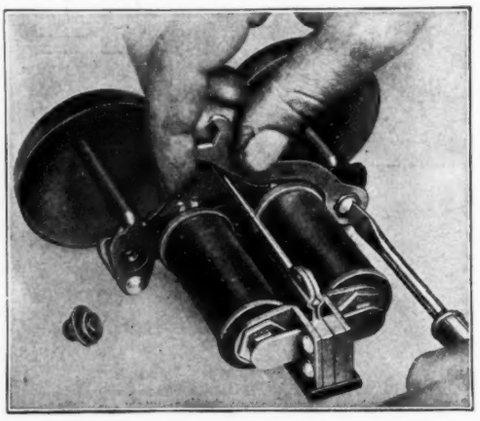
B. L. Moore, vice-president of the company recently sailed from San Francisco on a tour of the world. Mr. Moore will visit New Zealand, Australia, Dutch East Indies, China, India and will then visit the numerous agents of the Federal company in European countries. He will likely be absent about a year.

A New Kellogg Ringer for Subscriber Sets.

Signaling is important. Unfortunate is the subscriber who has a telephone that won't ring when friends call up. It isn't long before it is discovered, however, then —woe to the local exchange manager.

The Kellogg Switchboard & Supply Co. is placing an improved type of harmonic ringer on the market. The codes Nos. 72A, 73A and 74A are for use on Kellogg instruments while the No. 75A is for use on other makes.

This new ringer has the long type coils wound with silk-covered wire to prevent short-circuiting. The magnet wire terminates on metal punchings which are securely fastened to the spool heads. The gongs are of heavily enameled brass, giving a good clear signal. But the particularly interesting feature is the positive



Easy to Adjust and a Good Clear Ring Are Claims for the New Kellogg Ringer.

and easily-managed adjustment of these bells.

As the illustration shows, a special wrench furnished with each ringer, turns the lock nut after the screw has been released, to the desired position—a movement towards the coils bringing the gongs closer, and visa versa. This is all accomplished by the eccentric lock nut which is shown lying beside the ringer. Even though the locking screw should be left loose, the nut will hold the adjustment securely.

The City of Mansfield Turns to Automanual Service.

A normal Sunday's work in the Mansfield (Ohio) Telephone Co.'s exchange is 16,000 calls. But on Sunday, June 12, bedlam prevailed and 42,000 calls were put through. Why? Because Mansfield was trying out its new automanual system.

The cut-over was made at 1 a. m. and in the old room used by the operators, as the minutes ticked off, the calls through the old system of plugging became less and less.

In an adjoining room, however, a brighter and busier scene was enacted. There, 12 operators sitting at comptometer-like machines, worked eagerly side by side, taking care of the work and liking it so well, that, as one remarked, they didn't "want to go home."

Under the automanual system, as is generally known, when the receiver is removed from the hook, a red light flashes instantly down the operating board in the telephone office, stopping at the board of the first "central" or operator who is not busy.

"Number," she asks in the same old way, but after it has been given, with five touches made as quickly as pressing down the keys of an adding machine, she completes the connection and has no further connection with the call.

If the number asked for is busy, there is a "busy buzz" in the ear.

It does not avail anything to shake the hook up and down under the automanual system. The instant the hook is lowered, the entire connection is automatically severed.

Neither is it necessary to ask Central to ring the number asked a second time —as a second call has to be put through to do so.

The bell is rung at regular intervals until the call is answered by the party called or the party making the call hangs up the receiver. The ringing of the bell is automatic and is in no way under the control of the operator.

All connections are likewise secret with no connections between the operator and the two stations in use on independent lines. The operator has connection with only one station at a time.

The system carries with it its own automatic check-up of each operation. It records the number of calls and tells just how quickly they are made. In this way, it acts as a check on the operator and provides the management with facts it desires.

Henry G. Brunner, mayor of Mansfield, and Edwin G. Slough, secretary of the chamber of commerce, had the honor of putting through the first call in this modern system.

Every telephone number of the city of Mansfield is changed. This means that subscribers will begin to memorize all over again the numbers which they call most frequently, or write them in conveniently located places.

Twelve complete operating units were placed in service as a result of the cut-over.

The old switchboard of the company was installed in March, 1902, the original board having 12 positions, which finally grew to 19.

LeRoy Wittemire is manager of the Mansfield Telephone Co. and Gustav Hirsch, of Columbus, Ohio, is consulting engineer.

Back toward the Good Old Days!

COLUMBIA Gray Label Dry Cells

Reduced in Price

JUNE 1st brought the welcome news that all standard types of Columbia Dry Cells and Unit Batteries have been reduced substantially in price.

This means that the same high quality coupled with the new low price brings you

"Still Less Cost per Day of Service"

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CANADIAN NATIONAL CARBON CO., LIMITED, TORONTO

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Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Record of Telephone Patents

1,373,019. March 29, 1921; filed December 27, 1918. ACOUSTIC DEVICE; five claims; P. M. Rainey, Glen Ridge, N. J.; assigned to Western Electric Co. This transmitter has means co-operating with the current of air for increasing the amplitude of vibration of the diaphragm.

1,372,795. March 29, 1921; filed March 4, 1920. TELEPHONE ATTACHMENT; four claims; H. W. Belles, Stewardson, Ill. A disinfecting holder for mounting in a mouthpiece is described. There is a projection from it for supporting a card.

1,373,447. April 5, 1921; filed February 12, 1920. TELEPHONE EXCHANGE SYSTEM; five claims; L. Polinkowsky, Antwerp, Belgium; assigned to Western Electric Co. Impulse mechanism is responsive to one of a series of current impulses for variably setting a multi-position register, which controls means when in a set position for selecting one of a number of selective switches for establishing telephone connections. The impulse mechanism is responsive to another series of impulses for again setting the register while means are controlled by the register in accordance with its subsequent setting for operating the selected switch.

1,373,607. April 5, 1921; filed November 10, 1916. SUBSTATION TELEPHONE SETS; 13 claims; J. Erickson, Chicago; assigned to Automatic Electric Co. The feature of this set is a hook switch having three positions. The listening circuit is closed when the hook switch is moved from the first to second position and when moved from the second to third position, the listening circuit is rendered inoperative and the talking circuit is closed.

1,373,624. April 5, 1921; filed May 10, 1916. AUTOMATIC TELEPHONE SYSTEM; 22 claims; T. G. Martin, Chicago; assigned to Automatic Electric Co. The circuit is individual to one of a number of progressively movable switches. Provision is made for connecting a source of current over the individual circuit to operate a signal for the called line and for then connecting the source of current over a circuit common to the switches to the signal to operate it. Means are provided for interrupting the common circuit to intermittently operate the signal.

1,374,003. April 5, 1921; filed September 29, 1917. RECLAIMING DRY BATTERIES; 16 claims; C. Ellis and A. A. Wells, Montclair, N. J.; assigned to National Carbon Co. This process of reclaiming spent dry batteries of the LeClanche type consists in heating the cell to a temperature to melt the pitch and soften the solder, stripping the zinc sheet from the carbon and depolarizing element, in separating the carbon element and in reviving the depolarizing material.

1,374,184. April 12, 1921; filed July 9, 1917. TELEPHONE SYSTEM; 16 claims; E. C. Britton, New York; assigned to Western Electric Co. The feature of this system is a switch arranged to perform the functions of either a selector switch or of a connector switch. It is arranged to be reached by a number of paths and means controlled by the path over which connection is made, determine which function the switch will perform.

1,374,188. April 12, 1921; filed May 11, 1918. TELEPHONE SYSTEM; seven claims; H. P. Clausen, Mount Vernon, N. Y., and C. L. Goodrum, New York; assigned to Western Electric Co. In this system of trunking between a number of exchanges, means are provided at each exchange for indicating the condition of the trunk circuits interconnecting other exchanges.

1,374,192. April 12, 1921; filed July 2, 1917. SELECTIVE SYSTEM; four claims; A. F. Dixon, Newark, N. J.; assigned to Western Electric Co. A selecting mechanism at each station comprises a group of magnets selectively operated in accordance with impulses transmitted over a line conductor by the transmitting mechanism at another station. A distributer at each station is operable to connect the transmitting mechanism at that station with one of the line conductors and to connect the selecting mechanism at that station with the other of the line conductor.

1,374,193. April 12, 1921; filed April 13, 1919. ELECTROMAGNETIC RELAY; three claims; W. H. D. Ford, Yonkers, N. Y.; assigned to Western Electric Co. The feature of this relay is an extension on the core and in magnetic contact therewith which is adapted upon energization of the coil to exert a magnetic flow upon the relay armature in a direction opposite to that exerted by the core itself.

1,374,201. April 12, 1921; filed September 19, 1919. SELECTOR; six claims; J. A. Hall, Bayside, N. Y.; assigned to Western Electric Co. This selector comprises a series of switching relays. An impulse circuit energizes the relays in succession and a previously energized relay is de-energized upon the beginning of the impulse for energizing the next one of the relay.

1,374,219. April 12, 1921; filed February 12, 1919. COMPOSITE TRANSMISSION SYSTEM; 10 claims; H. S. Osborne, New York; assigned to American Telephone & Telegraph Co. In this electrical signaling system in which side and phantom telegraph circuits are formed on conductors carrying telephone current; provision is made for transmitting telegraph signaling currents in both directions over the conductors of the system concurrently with the telephone currents. Low-pass filters are connected in the branches leading to the respective side circuits, each of the filters being provided with a neutral point. These neutral points are so joined that the filters act upon both the side and the phantom circuit, while other low-pass filters are connected in and affect only the separate side circuit and the phantom circuit respectively.

1,374,220. April 12, 1921; filed February 12, 1919. COMPOSITE SIGNALING SYSTEM; five claims; H. S. Osborne, New York; assigned to American Telephone & Telegraph Co. In this signaling system two pairs of conductors are arranged to provide two side and one phantom circuit for telephone currents and the telegraph currents. Means are common to both the side and phantom circuit for separating the telephone and telegraph currents.

1,374,221. April 12, 1921; filed February 12, 1919. COMPOSITE PHANTOM CIRCUITS; three claims; H. S. Osborne, New York; assigned to American Telephone & Telegraph Co. In this system telephone apparatus is connected to two pairs of line conductors so as to provide two side circuits and one phantom circuit. Telegraph apparatus is bridged across each pair of conductors, forming one of the side circuits. This apparatus includes a sending set whose elements are arranged to provide a mid or neutral point with respect to the side circuit conductors. Other telegraph apparatus is connected between the neutral points.

1,374,366. April 12, 1921; filed June 26, 1916. TELEPHONE SWITCH; 30 claims; G. W. Dickerson, Galion, Ohio; assigned to North Electric Mfg. Co., Galion. In this switch a number of sets of contacts are arranged in a row independent of one another. Each set of contacts comprises a number of flexible springs. A number of other contacts are also arranged in rows, and are operated for co-operating with an individual set of flexible contacts, independent of the other contacts in the row.

1,374,630. April 12, 1921; filed July 19, 1917. SELECTING MECHANISM; six claims; E. P. Bancroft, Brooklyn, N. Y.; assigned to Western Electric Co. This selecting mechanism has a current-impulse distributer with a number of selecting magnets connected thereto. A relay connects a number of condensers of which at least one is normally charged through the distributer to the selecting magnets to effect their operation. A condenser is associated with each selecting magnet for prolonging the flow of current therethrough.

1,374,688. April 12, 1921; filed May 12, 1919. TRANSMITTER; four claims; F. E. Summers, Memphis, Mo. The feature of this transmitter is a provision for the attachment of the cap containing the variable resistance substance to an insulating disk, which carries electrodes so that a number of caps and disks may be assembled in tandem with the diaphragm.

1,375,209. April 19, 1921; filed August 31, 1920. TELEPHONE MOUTHPIECE; two claims; J. Chefer, Chester Pa. The feature of this mouthpiece is a disk which is confined between sections of the mouthpiece. A radial lug is attached to the disk so that it may be rotated to open or close the mouthpiece opening.

1,375,230. April 19, 1921; filed March 29, 1917. TELEPHONE EXCHANGE SYSTEM; 13 claims; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. In this switching mechanism contact brushes are adapted to be directively moved in one direction into juxtaposition individually with superimposed flat multiple units, and on being further moved in a second direction transversely of the units to hunt over a number of sets of contacts of which the units are composed and engage any of the sets of conductors in a selected unit individually.

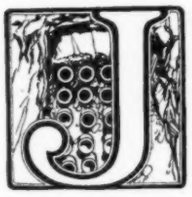
1,375,276. April 19, 1921; filed December 28, 1918. TELEPHONE SYSTEM; 12 claims; H. P. Clausen, Mount Vernon, N. Y., and C. L. Goodrum, New York; assigned to Western Electric Co. The feature of this system is the provision of means associated with certain sections of a sectionalized trunk circuit for indicating the status of other sections, and means which operate in synchonism for controlling the first mentioned means.

1,375,277. April 19, 1921; filed June 5, 1919. TELEPHONE SYSTEM; five claims;

"When there is obvious danger of electrolysis we *always* use fibre conduit"

THAT'S what a telephone engineer said the other day. Then he went on to say that a series of careful tests had thoroughly demonstrated to his company that Johns-Manville Fibre Conduit was "not only the best but also the cheapest protection against electrolysis."

ON RAILROAD bridges, for instance, where there are acid fumes, smoke or refrigerator car drippings to be resisted, Johns-Manville Fibre Conduit keeps cable sheaths safe. It can't rust, rot or corrode, and is strong and tough.



JOHNS-MANVILLE FIBRE CONDUIT is, of course, primarily for use underground, where its thorough impregnation enables it to resist earth acids and road seepage, and where its smooth bore and flexibility make installation easy.

So far as cost goes—Johns-Manville Fibre Conduit is cheaper to buy, cheaper to lay and cheaper to draw cable through—and will last indefinitely. Ask the nearest branch for the free handbook.

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JOHNS-MANVILLE ELECTRICAL MATERIALS

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

H. P. Clausen, Mount Vernon, N. Y., and C. L. Goodrum, New York, assigned to Western Electric Co. In this automatic system a sender, arranged to transmit long and short impulses, is associated with each of the telephone lines. A slow-acting relay, which is responsive to the long impulses transmitted by the senders, selects a particular one of the brush sets of the automatic switches provided for interconnecting the lines.

1,375,351. April 19, 1921; filed November 23, 1920. CALL DISTRIBUTING ARRANGEMENTS FOR TELEPHONE PLANTS; eight claims; G. A. Betulander, Sodertorns, Villastad, and N. G. Palmgren, Stockholm, Sweden; assigned to The Relay Automatic Telephone Co., Ltd. A number of relays are adapted to mark corresponding lines as calling, the lines and relays being divided into a number of groups. A group relay is alloted to each group and adapted to operate upon a call occurring in its group. Means are adapted upon such group operating to prevent more than one of the marking relays from remaining operated.

1,375,405. April 19, 1921; filed January 22, 1918. APPARATUS FOR TESTING CAPACITY OF ELECTRIC CONDUCTORS; W. H. Martin, New York; assigned to American Telephone & Telegraph Co. An adjustable capacity forms one arm of a Wheatstone bridge arrangement with the circuit to be tested forming another arm. Means are included in part in each of the arms to adjust the capacity until the bridge is balanced.

1,375,414. April 19, 1921; filed January 22, 1918. APPARATUS FOR TESTING CAPACITY DEVIATIONS AND UNBALANCE OF ELECTRIC CONDUCTORS; eight claims; H. S. Osborne, New York; assigned to American Telephone & Telegraph Co. This system comprises circuit terminals to which may be connected a number of conductors capable of arrangement in phantom and side circuit relation. Provision is made to associate either a current source or a receiving device with the phantom circuit and the other with the side circuit thereby producing a cross-talk effect in the receiver. The capacity unbalance between the phantom and the side circuit is indicated by the provision made for balancing out the cross-talk effect. The conductors are associated with a standard capacity element and the difference between the conductors and the standard balance is indicated directly by the arrangement.

1,375,447. April 19, 1921; filed June 24, 1913. MEANS FOR AMPLIFYING CURRENTS; 29 claims; L. DeForest, New York; assigned to DeForest Radio Telephone & Telegraph Co. An electric circuit which includes a source of current is combined with a source of weak undulatory current. The conductivity of the circuit is varied by and in accordance with the undulatory current. A reactance is connected across the circuit and an audion is conductively connected with the circuit.

1,375,465. April 19, 1921; filed May 18, 1918. DEVICE FOR CONVERTING SOUND OR OTHER VIBRATIONS INTO VARIATIONS IN AN ELECTRICAL CIRCUIT; four claims; C. R. Moore, East Orange, N. J.; assigned to Western Electric Co. This device of the inertia type has energy absorbing material holding a pair of electrodes in space relation. Means are provided to reinforce internally the energy absorbing material against flexure.

1,375,691. April 26, 1921; filed September 8, 1917. SELECTIVE SWITCH; 10 claims; C. L. Goodrum, New York; assigned to Western Electric Co. A number of brushes are mounted on an endless carrier which has a driving engagement with a pair of rotatable members, and arranged to make contact with stationary circuit-terminating feed members, and circuit terminals to electrically interconnect the feed members and circuit terminals.

1,375,692. April 26, 1921; filed February 24, 1919. MACHINE SWITCHING DEVICE; 11 claims; C. L. Goodrum, New York; assigned to Western Electric Co. Step-by-step mechanism and power-drive mechanism operate directly upon a movable carriage in response to the operation of a subscriber's impulse-sending mechanism to move the movable contacts of the carriage into engagement with a desired set of stationary contacts in a desired group and sub-group.

1,375,712. April 26, 1921; filed March 25, 1918. TELEPHONE EXCHANGE SYSTEM; 13 claims; A. E. Lundell, Chicago; assigned to Western Electric Co. Selective switches are arranged to extend the connecting circuit associated with a trunk circuit to a called line. Switching means associate the calling line with the trunk circuit which is arranged to transmit current impulses over its two conductors in series. The selective switches are operated by means responsive to these impulses, the trunk circuit being electrically disconnected from the calling line and connecting circuit during the transmission of impulses. Connecting means are operated upon response of the called subscriber for connecting the trunk to the connecting circuit and a second connecting means is responsive to the operation of the first connecting means for connecting the calling line to the trunk circuit.

1,375,739. April 26, 1921; filed June 27, 1918. VACUUM TUBE APPARATUS; 6 claims E. O. Scriven, New York, N. Y.; assigned to Western Electric Co. A number of vacuum tubes are arranged in series each having a cathode and a grid. Provision is made for applying to the grid of one of the tubes the potential across the cathode of another tube.

1,375,762. April 26, 1921; filed May 10, 1919. DISTRIBUTING SWITCH; 8 claims; G. Thompson, Mount Vernon, N. Y.; assigned to Western Electric Co. In this automatic switch a number of operating members in fixed relation to one another have a driving mechanism in common. Provision is made to bring these members successively into operative relation with circuit closers.

1,376,371. April 26, 1921; filed October 2, 1916. AUTOMATIC TELEPHONE SYSTEM; 40 claims; G. A. Yanochowski, Chicago; assigned to Kellogg Switchboard & Supply Co. Primary and secondary switches are provided with contact makers adapted to remain in their antecedent progressive position, a group of first selector switches for each group of secondary switches. Means are provided for preventing any primary switch from connecting to an idle secondary switch in a group where all the first connector switches are busy.

1,376,391. May 3, 1921; filed February 24, 1919. TELEPHONE TOLL CIRCUITS; 6 claims; O. M. Arnold and J. F. Toomey, New York; assigned to American Telephone & Telegraph Co. The feature of this circuit is a sleeve relay associated with the toll trunk which is operable upon the actuation of a relay associated with the trunk to establish a talking connection through the cord circuit for answering calls incoming over the trunk.

1,376,719. May 3, 1921; filed March 18, 1920. WHISPER PHONE; 2 claims; W. Molloy, Chicago. This device consists of an elongated and tapered hollow body member having between its ends a longitudinally extended elongated opening and provided at one of its ends with an outlet opening and means to attach it to a telephone transmitter. The other end is enlarged and substantially semi-spherical in shape with its concave surface presented toward the outlet.

1,376,814. May 3, 1921; filed February 12, 1919. MEASURED SERVICE TELEPHONE SYSTEM; 12 claims; E. Jacobsen, New York; assigned to Automatic Electric Co. In this automatic system provision is made for opening the talking circuit at the exchange when a called subscriber answers and means are controlled by the calling subscriber for again closing the talking circuit.

1,376,848. May 3, 1921; filed March 29, 1920. AUTOMATIC TELEPHONE SYSTEM; 8 claims; B. D. Willis, Oak Park, Ill.; assigned to Automatic Electric Co. The feature of this system is the provision of means operated upon the response to the called subscriber which substitutes a battery feed relay in the connector switch for the line relay in the circuit of the calling line, the connection being such that the direction of current flow in the calling line is reversed.

1,376,893. May 3, 1921; filed May 13, 1918. TELEPHONE SWITCHING APPARATUS; 18 claims; J. L. McQuarrie, Montclair, N. J.; assigned to Western Electric Co. A switching mechanism is arranged for a number of selective movements and is operated to select one of a number of contact-making members each of which is adapted to establish a connection between one of the incoming and one of the outgoing circuits.

1,377,144. May 3, 1921; filed December 6, 1919. TRANSMITTER; 5 claims; F. C. Breckenridge, Providence, R. I.; assigned to American Thermophone Co., Boston, Mass. This current-varying device comprises an extremely thin conductor which is mounted in a slotted opening in an inclosure. A mouthpiece is provided so that variations of air pressure may be directed into the inclosure of the wire.

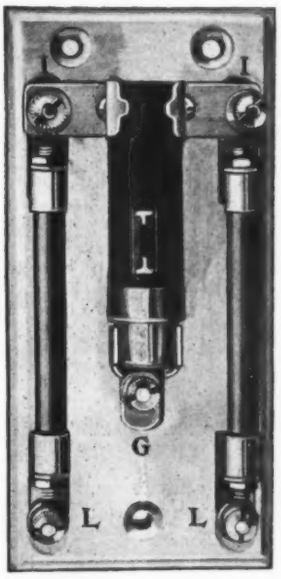
1,377,225. May 10, 1921; filed March 19, 1919. SEMI-AUTOMATIC TELEPHONE SYSTEM; 18 claims; A. J. Seymour, St. Paul, Minn.; assigned to Automatic Electric Co., Chicago. In this semi-automatic system means are provided for automatically associating a calling device with a trunk line when seized by the cord circuit. The calling device is removed from the trunk line by means controlled by a called subscriber to whom the connection is extended.

1,377,940. May 10, 1921; filed September 23, 1919. SOUND CONCENTRATOR FOR TELEPHONE TRANSMITTER; 3 claims; E. E. Taylor, Loogootee, Ind. In this sound concentrator a cap for the mouthpiece end of the transmitter has a central sound transmitting opening over and approximately of the same size as that of the transmitter to snugly embrace the transmitter casing. The depth of the cap is such as to space the sound-receiving space of the cap away from the transmitter by about approximately half of the full depth of the cap. The cap has an interior cylindrical wall surrounding the transmitter mouthpiece with the outer end of the cap provided with frusto conical interwalls meeting intermediately between the cylindrical wall and their merging whereby the walls of the cap constitute reflecting services for sound waves, directing the waves toward and concentrating them onto the central portion of the receiver diaphragm.

TELEPHONE INSURANCE

Type 440 Vacuum Arrester
Two Line With Fuses

Insures Non-Grounding of Lines
Insures Cables
Insures Clear Transmission
Insures Balance of Potential Between Pairs
Insures Full Protection from Power Crosses or Lightning
(Air-Gap Equivalent .001)



Type 440 Arrester is the result of our recent efforts to develop a type that would embody all the advantages of a Vacuum Arrester for telephone service at a price within the reach of every Telephone Company. By bringing the two line wires into the same vacuum chamber as the ground circuit, a degree of sensitiveness to static discharges and a better balance of protection between the two lines is accomplished.

The type 440 is complete with fuses. Price $1.50 each.

MANUFACTURED BY
L. S. BRACH MFG. COMPANY
NEWARK, N. J.

The Policy

of Lynton T. Block & Co. is to issue the most satisfactory and comprehensive insurance to be had anywhere—

Furnishing absolute protection at cost.

Embodying all the standard features and more.

Selling at established rates.

Returning savings at the end of the policy period.

Giving a claims service that is not equalled elsewhere.

It is an honest policy, carried out in an honest way and gives a square deal under all conditions.

This forms the creed of every member of the organization and has built up the reputation of Lynton T. Block & Co. until it is one of the best and most favorably known in the Mississippi Valley.

Insurance at Cost

Workmen's Compensation
Employers' Liability
Public Liability
Teams Liability
Contractors' Liability
Elevator
Automobile
Fire Insurance

LYNTON T. BLOCK & CO.
UNDERWRITERS OF ST. LOUIS
Operating
UTILITIES INDEMNITY & FIRE EXCHANGES
EMPLOYERS INDEMNITY CORPORATION
Chamber of Commerce Building **St. Louis**

1,377,555. May 10, 1921; filed May 16, 1910. TELEPHONE SYSTEM; 26 claims; C. C. Bradbury, Chicago; assigned to Western Electric Co. In this system for establishing either manual or automatic connection with either manual or automatic lines at the central office, the establishment of an automatic connection with either of the lines is adapted to place battery potential upon the test contacts of the manual connecting means and ground potential upon the test contacts of the automatic connecting means to indicate that the line is busy both for automatic and manual connection. The establishment of a manual connection with either of the lines is adapted to indicate that the line is busy both for automatic and manual connections.

1,378,170. May 17, 1921; filed December 19, 1918. REPEATER CIRCUITS; eight claims; L. Espenschied, Hollis, N. Y.; assigned to American Telephone & Telegraph Co. In this signaling system for simultaneously transmitting telephone and telegraph currents, an amplifier is adapted for simultaneously amplifying both currents. Means are provided for equalizing the attenuation of the various frequencies comprised within the telephone range and within the telegraph range.

1,378,231. May 17, 1921; filed March 10, 1919. AUTOMATIC TELEPHONE SYSTEM; 21 claims; J. H. Homrighous, Oak Park, Ill.; assigned to Automatic Electric Co. An auxiliary switch is individual to an automatic switch for selecting a trunk line. Means are responsive to the first series of impulses transmitted over the line leading to the automatic switch for causing the auxiliary switch to select one of the trunk lines without operating the automatic switch.

1,378,392. May 17, 1921; filed December 26, 1919. SIGNALING SYSTEM; four claims; D. F. Whiting, New York; assigned to Western Electric Co. An amplifier is provided for amplifying talking and signaling current. Its output circuit is connected with one of two line sections while an input transformer connects the input circuit with the other line section. Means are associated with this line section for controlling the amplification of the amplifier to currents of talking frequencies. A loop circuit, tuned to current of the signaling frequencies, is associated therewith and rendered effective when signaling current is impressed upon the terminals thereof to alter the effect of the amplifier controlling means upon the signaling currents.

1,378,585. May 17, 1921; filed August 14, 1917. TELEPHONE SYSTEM; two claims; E. Curnutt, Garnett, Kan. In this party line system a normally-open switch in each subscriber's set disconnects it from the main line. A polarized step-by-step magnetic means, when energized by alternating current, operates to close the switch. A generator adapted to generate direct and alternating currents is in series with a reversing switch and the magnetic means. The step-by-step mechanism is restored to initial position and the switch opened when direct current is sent out from the generator.

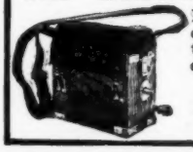
1,378,708. May 17, 1921; filed June 17, 1917. MICROPHONE; 10 claims; R. H. Manson, Rochester, N. Y.; assigned to Stromberg-Carlson Telephone Co. The casing of this microphone is provided with parallel inner walls and has an open end with a flexible diaphragm clamped to the casing to form a closure therefor. A beveled mounting for an electrode is located in the casing and secured to the diaphragm, and has a second electrode co-operating with it. The comminuted resistance material engages the opposing faces of these electrodes.

1,378,869. May 24, 1921; filed September 19, 1917. CIRCUIT BREAKER RELAY; 17 claims; W. Kaisling, Chicago; assigned to Kellogg Switchboard & Supply Co. The armature of this relay has members which are adapted to co-operate with ears of a heel iron to pivotally support the armature in position while a spring maintains it in position.

ADLETS
Continued from Page 46

CENTRAL BATTERY SERVICE for your Magneto Exchange
without discarding your present equipment. Big savings and better service. Write for data.
R. & R. Telephone Equipment Co.
TUSCOLA, ILLINOIS

Star Expansion Bolts
Where Safety is concerned the Best is none too good.
147-9 Cedar St. 700 E. 3rd St. 120 West Lake St.
NEW YORK LOS ANGELES, CAL. CHICAGO

The "STEWART" TEST SET

Detects trouble without opening the line. Used by thousands of telephone companies. Sent on trial.
Write before buying any other.
STEWART BROTHERS
Ottawa, Ill.

"NAUGLE" POLES
Plain or Butt Treated. Largest Stocks.
READY FOR IMMEDIATE SHIPMENT
NAUGLE POLE & TIE CO.
Main Office: 50 E. Madison St. CHICAGO

ORANGEBURG FIBRE CONDUIT
THE STANDARDIZED CONDUIT
WRITE FOR PARTICULARS---BOOK H
FIBRE CONDUIT CO.
ORANGEBURG N. Y.
NEW YORK CHICAGO BOSTON
SAN FRANCISCO NEW ORLEANS

NORTHERN POLE and LUMBER COMPANY
POLE SERVICE
DULUTH MINNESOTA

NORTHERN **CEDAR POLES** WESTERN
BUTT-TREATING GUARANTEED GRADES
BELL LUMBER COMPANY, MINNEAPOLIS, MINN.

NORTHERN-WESTERN CEDAR POLES
A FULL ASSORTMENT OF SIZES
PROMPT SHIPMENTS ASSURED
T. M. PARTRIDGE LUMBER COMPANY
Lumber Exchange MINNEAPOLIS

To insure delivery on time order your poles as early as possible.

White Cedar Poles
A SPECIALTY
Yards in Minnesota, Ontario, and Manitoba
Prompt and Satisfactory Service
CANADIAN CEDAR & LUMBER COMPANY, Limited
301 Electric Ry. Chambers Winnipeg, Manitoba

CEDAR POLES
NORTHERN or WESTERN
Plain or Butt Treated
THE VALENTINE-CLARK COMPANY,
SPOKANE, WASH.
Toledo Chicago Minneapolis

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Chas. W. Baker, Pres. Clarence B. Mitchell, Vice-Pres.

Platinum

Foil, Sheet, Wire,
for all purposes —— in all forms

BAKER Platinum Contacts

give best spark —— wear longest

IRIDIO-PLATINUM RIVETS
PLATINUM COMPOSITE CONTACTS
AND WELDED SCREWS

Send for BAKER Platinum Contacts Booklet

SCRAP PLATINUM PURCHASED

BAKER & CO., INC.

Refiners and Workers of Platinum Gold and Silver

30 Church St. New York | 54 Austin St. NEWARK, N. J. | 5 S. Wabash Ave. Chicago.

Belden

Rubber Covered Copper-Clad Steel Telephone Wire

Copper-weld steel wire made by the Molten Welding Process is 8% lighter and 50% stronger than the same size of copper wire. It is insulated with no test, 100 megohm and 30% rubber and braided with or without raised tracer. Our prices are attractive. Quotation with samples will be mailed promptly upon request.

We also make Interior, Exterior and Pothead Wires, insulated with no test, 100 Megohm or 30% Beldenite rubber.

BELDEN MANUFACTURING COMPANY
Electrical Wire, Cable and Cordage

Main Office & Factory
Chicago, Ill.

Eastern Warehouse
Metuchen, N. J.

HAZARD

Rubber Insulated
TELEPHONE WIRE

The quality of rubber insulated wire depends not so much on any standard specifications as on the ability of the manufacturer to properly and skillfully combine the ingredients into a uniform homogeneous compound and impart long life to it through perfect vulcanization.

1848—1921

Hazard Manufacturing Co.

New York Pittsburgh Chicago
Denver Birmingham
Wilkes-Barre, Pa.

Makers of Quality Wire Rope since 1848

All the advantages of Specialization

are received in their highest degree by the user of

RUNZEL-LENZ
CORDS--CABLES--WIRES

In our products are embodied the long and intensive experience of exclusive manufacturers—excellent materials—and designs that give the greatest service efficiency.

RUNZEL-LENZ
ELECTRIC MFG. CO.

1751-53 N. Western Ave. CHICAGO, ILLINOIS

Pacific Coast Distributor:
COKER ELECTRIC SUPPLY CO.
253 So. Broadway, Los Angeles, Calif.

Please tell the Advertiser you saw his advertisement in TELEPHONY.

A Way to Larger Profits

STROMBERG-CARLSON No. 3-A CONVERTER

FIRST—**Install a Stromberg-Carlson Multi-Party Harmonic System.**

SECOND—**Place four parties on a line.**

THIRD—**Mail four bills per line instead of only one.**

To accomplish this, you will need the following apparatus:—

One, Stromberg-Carlson four frequency harmonic converter—common to your plant.

One, Stromberg-Carlson four party master key—on each position of your switchboard.

Four, Stromberg-Carlson harmonic sub-station instruments—on each party line.

The results are—Maximum Increase of Revenue with Minimum Investment—this means Larger Profits.

WRITE FOR BULLETIN No. 1019 AND COMPLETE INFORMATION

Stromberg-Carlson Telephone Mfg. Company

Rochester, N. Y. Chicago, Ill. Kansas City, Mo. Toronto, Can.

JOBBERS

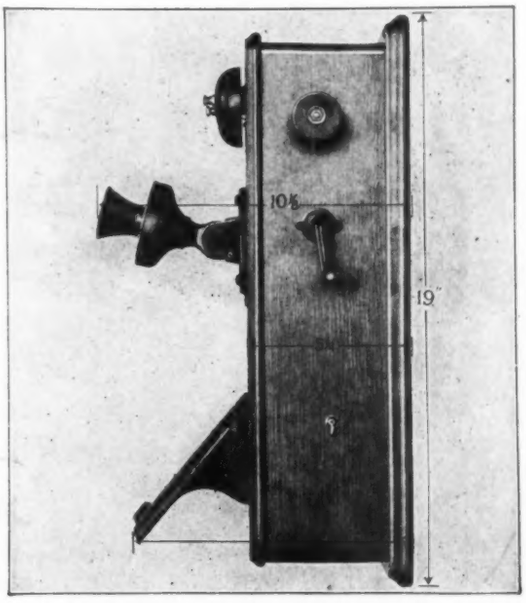
Midland Electric Co., Regina, Sask.
Charleston Electrical Supply Company, Charleston, W. Va.

DISTRIBUTORS

Garnett Young & Co., San Francisco, Cal., Los Angeles, Cal. Portland, Ore., Seattle, Wash.
Scoville Mercantile Co., Atlanta, Ga.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

A First-Class Transmitter Arm



The Transmitter Arm is a feature of the Stromberg-Carlson No. 896 Magneto Telephone—

It is short enough to permit shipment in a shallow box—10⅛ inches clears the telephone from front to back.

It is also short enough to give the subscriber an unobstructed view of his pencil point, while standing close to the mouthpiece in conversation.

It is more pleasing in appearance and less liable to damage than the old fashioned long type transmitter arm which protrudes beyond the writing shelf.

It has a wide range of vertical swing permitting adjustment to the subscriber's convenience.

It is equipped with a rigid joint easily adjusted to hold the transmitter firmly in any desired position.

It is designed to hide the transmitter cords from view and to protect them from injury.

This First-Class Transmitter Arm is one of the twenty-four reasons why you will prefer the No. 896 Magneto Telephone.

WRITE FOR BULLETIN No. 1024

Stromberg-Carlson Telephone Mfg. Company

Rochester, N. Y. Chicago, Ill. Kansas City, Mo. Toronto, Can.

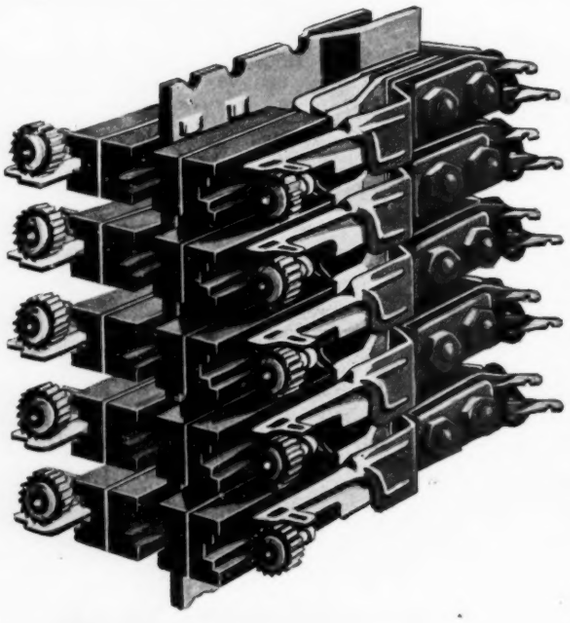
JOBBERS

Midland Electric Co., Regina, Sask.
Charleston Electrical Supply Company, Charleston, W. Va.

DISTRIBUTORS

Garnett Young & Co., San Francisco, Cal., Los Angeles, Cal. Portland, Ore., Seattle, Wash.
Scoville Mercantile Co., Atlanta, Ga.

Cook No. 100 Central Office Protector



Protects the central office equipment against all electrical hazards.

The lightning arresters protect against lightning or other high potentials.

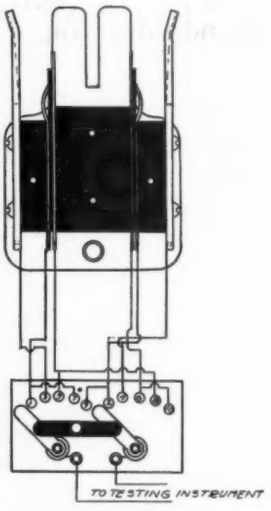
The heat coils protect against low potential currents or sneak currents. When the carbon arresters function it permanently grounds the outside line.

When the heat coil operates it opens the circuit, grounds the outside line and sets up an alarm signal.

The heat coils are self-soldering and all that is necessary to reset the protector is to push the switchboard spring back over the ratchet coil.

A test plug slipped over the protector affords a simple means of testing the outside or inside line, through or around the heat coil.

Made in 20-pair sections to fit any central office main frame.


TO TESTING INSTRUMENT
SWITCH CLOSED THRU CONTACTS
1 AND 2 TEST LINE THRU HEAT COILS
3 AND 4 TEST S W B'D
5 AND 6 TEST LINE DIRECT
7 AND 8 TEST ONE HEAT COIL
9 AND 10 TEST OTHER HEAT COIL

We shall be glad to give additional information.

Cook Electric Company

900-910 W. Van Buren Street CHICAGO

IF YOUR JOBBER DOES NOT HANDLE *COOK PROTECTION* WRITE DIRECT TO US

MONARCH

Double Service Telephones

When these MONARCH telephones are installed you are assured of the best telephone instrument service that is possible to secure, and which will be pleasing to your subscriber because of the neat appearance of the telephone and the good service he will get.

You will be pleased because of the low maintenance cost to keep these telephones in service, the good service you are giving your subscribers, and the remarkably few repair parts required as a result of MONARCH standardization.

MONARCH telephones have been on the market for almost a quarter of a century during which time they have been improved and refined to better your service and when improvements were made the improvements were made interchangeable with the old parts so that your standardization plan would not be broken.

Start standardizing NOW by using telephones standardized by the manufacturer and have fewer repairs. It will pay you big.

No. 234—3-bar 1000 ohm
No. 251—5-bar 1600 ohm
In Wall and Desk Types
Carried in Stock

It's
"Monarch for Service"

Monarch Telephone Manufacturing Co.

FACTORY AND GENERAL OFFICES
FORT DODGE, IOWA

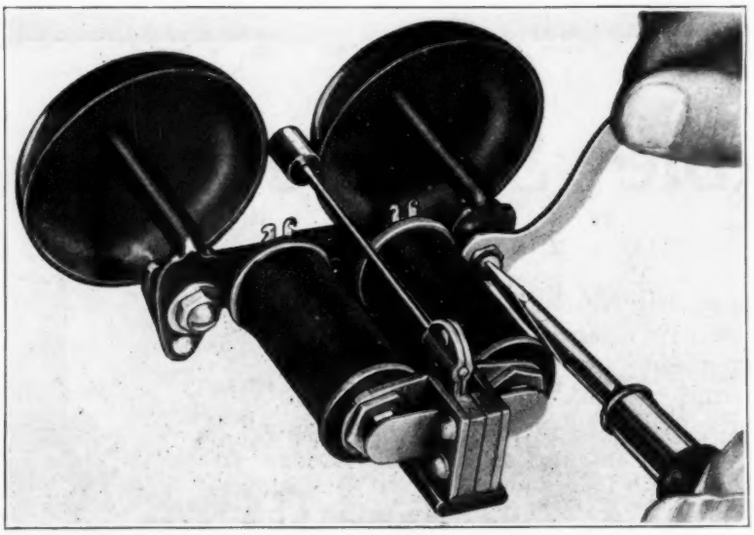
DISTRIBUTORS

Tel-Electric Co., Houston, Texas — Electric Supply Co., New Orleans, La. — Coker Electric Supply Co., Los Angeles, Cal.
Hendrie & Bolthoff Mfg. Sup. Co., Denver, Colo. — Fidelity Electric Co., St. Louis, Mo. — Corwin-Abrams Sales Co., Seattle, Wash.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

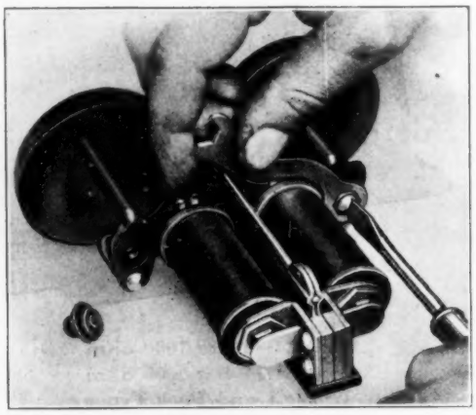
A Short Wrench Turn—positive, lasting adjustment

KELLOGG Harmonic Ringer



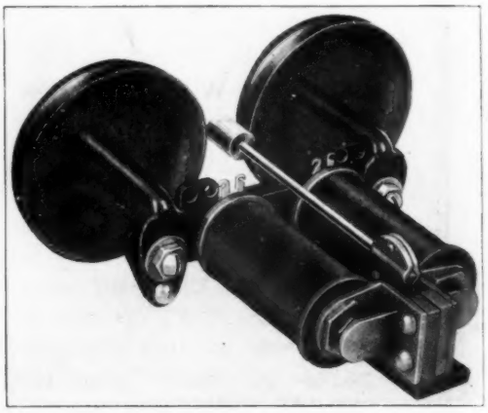
Guarantees Reliable Signalling

Adjustment completed in a jiffy

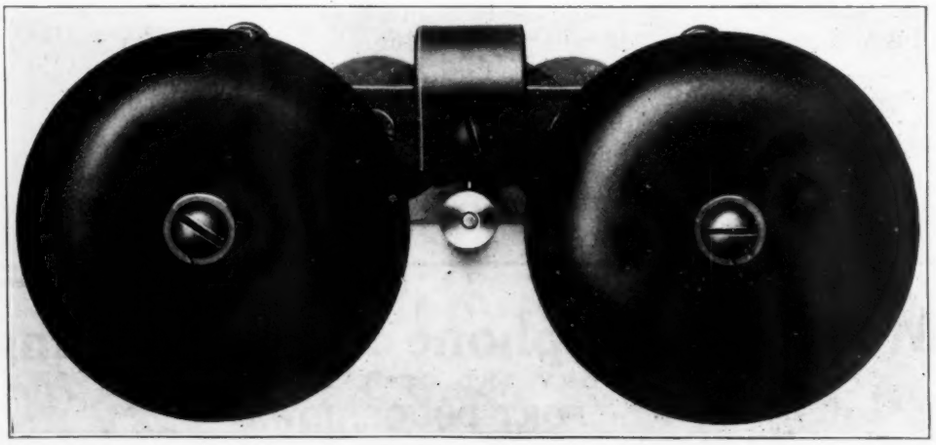


Wrench in place—loosening nut with screw driver

Concentric gongs held in position permanently with heavy screws and spring washers. Adjustment, as illustrated, by means of eccentric lock nut turned with wrench furnished; and ordinary screw driver.



With mounting adapted for other make boxes—Code No. 75



Code No. 72 Type—Center mounted brass gongs, heavily enameled, held rigidly by substantial screws and spring washers

Please tell the Advertiser you saw his advertisement in TELEPHONY.

The KELLOGG Harmonic Ringer

The announcement of this improved type ringer will be welcome news to many.

Solve your harmonic ringer adjustment troubles by installing this new Kellogg ringer. After properly adjusting it, forget it is there, as it will bother you no more.

The long type coils are wound with silk covered wire, preventing any possibility of short circuiting.

The magnet wire terminates on metal punchings, which are securely fastened to the spool heads.

Gongs are of brass, heavily enameled, giving a rich, clear tone. They are of standard size—2 1-2 inches.

Length of stroke and armature air gap remains unchanged during life of ringer.

Kellogg ringers are extremely sensitive, operating on 25% less current than any other make.

With the new adjustment all movable parts are locked immovably in place and remain so indefinitely. The fine adjustment necessary for harmonic ringers is easy to make with this Kellogg product. Even if locking screw should be left loose, the nut holds adjustment perfectly.

Order a supply of these ringers with the permanent adjustment today.

No. 72A for frequencies $33\frac{1}{3}$-50-$66\frac{2}{3}$-$16\frac{2}{3}$.

No. 73A for frequencies 30-42-54-66.

No. 74A for two-party service, 20 and 60 cycles.

No. 75A for other make telephones.

We will furnish these ringers in any other cycle that may be ordered, special.

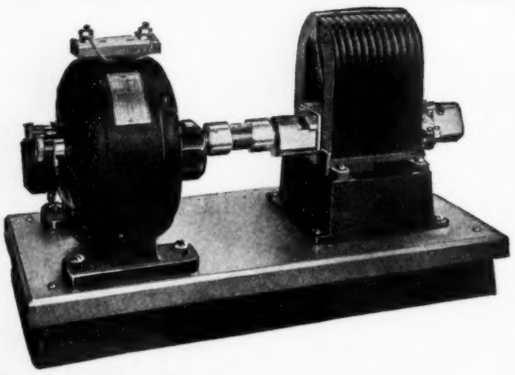
"Use is the Test"

Kellogg Switchboard & Supply Company

CHICAGO, ILLINOIS

Branch Offices: Kansas City, Mo., San Francisco, Calif., Columbus, Ohio

Distributing Houses: Canada West Elec., Ltd., Regina, Sask., Can.; Northwestern Elec. Equip't Co., St. Paul and Duluth, Minn.



To Say That This

Magneto Ringing Motor-Generator

Keeps the Telephone Exchange Smooth-Running, Means—

1. That the PURCHASER is freed from the necessity of battery testing, with its frequent renewal expense; and from the necessity of contact adjustments.
2. That his OPERATORS are saved the necessity of hand ringing, which slows up the telephone service to the subscriber.
3. That his SUBSCRIBERS having no further occasion to complain that "My bell does not ring satisfactorily," and "It takes forever to get the operator," are contented, prompt-paying patrons.

THE HOLTZE - CABOT ELECTRIC COMPANY

Boston New York
Chicago Philadelphia Baltimore
Detroit Minneapolis St. Louis

Put Your TELEPHONE DIRECTORY Problems Up to

R. R. DONNELLEY & SONS CO.
The Lakeside Press
731 Plymouth Court . . . CHICAGO

Largest High-Grade Printers in the World

SPECIALISTS in the printing of Telephone Directories and the furnishing of service connected therewith. Now printing the Telephone Directories for nearly three hundred cities and towns in the Mid-West.

INQUIRIES INVITED

OUR EXTRA HEAVY DOUBLE GALVANIZED WIRE INSURES

HIGHEST EFFICIENCY
LONGEST LIFE
LOWEST COST OF UPKEEP

It's easy to determine, TEST IT. As wire will test best, so also will it last best and give better satisfaction while it lasts.

We guarantee our wire to conform with all standard specifications as well as to be satisfactory to the purchaser.

IT'S THE ONE BEST PROVEN BY TEST—*TRY IT.*

Handled by most representative jobbers and supply houses.

Write for samples, test and compare.

INDIANA STEEL & WIRE COMPANY, MUNCIE, INDIANA, U. S. A.

MACHINE SWITCHING TELEPHONE SYSTEMS

for Public or Private Exchanges

THE AUTOMANUAL SYSTEM—An automatic system without dials, in which a few operators control the switching machines of a large exchange.

THE AUTOMANUAL SATELLITE—In which the machine switches in distant villages are controlled from AUTOMANUAL keyboards at a city exchange.

THE DIAL AUTOMATIC SYSTEM—In which the machine switches are controlled by dials at the subscribers' stations.

THE ALL-RELAY SYSTEM—In which there are relays only, with no moving selectors; adapted for dial or keyboard control.

THE NEW AUTOMATIC DIAL—Our latest product.

The North Electric Manufacturing Company
GALION, OHIO

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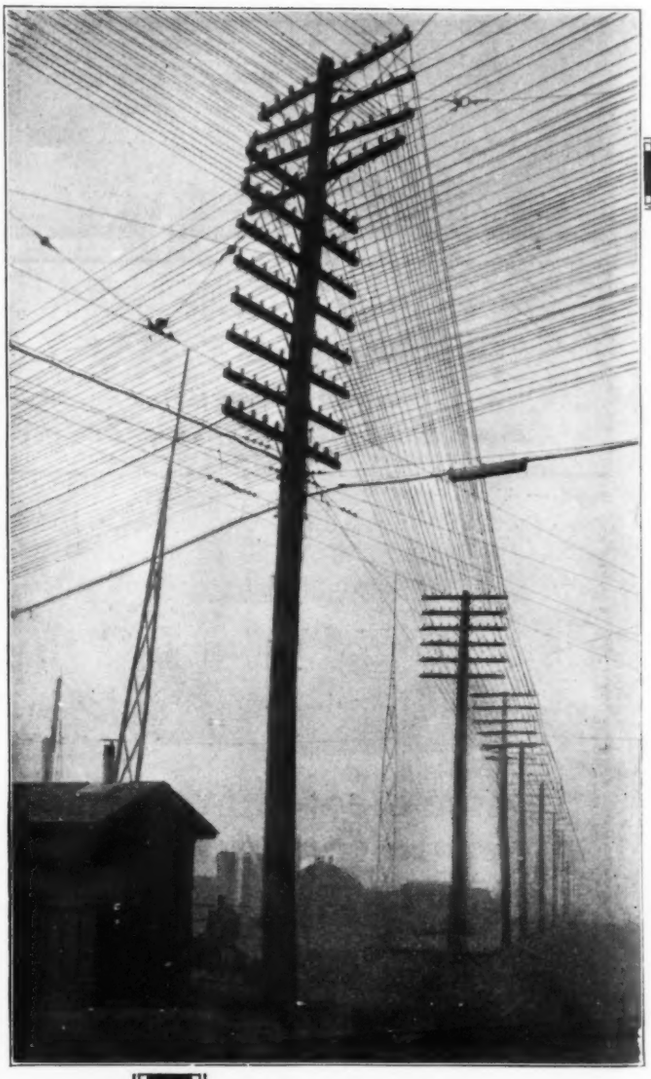


Northern White Cedar Poles

Maximum Strength and Service For Minimum Cost

AN ABSOLUTE MINIMUM of maintenance costs is ensured by the great strength and length of life of Northern White Cedar Poles.

Northern White Cedar Poles have the natural qualities that go to make up ideal poles. Their rich heartwood resists decay; their great strength makes them suitable for heaviest of construction; their light weight assures cheap transportation and ease of handling; and their non-conductivity insures the system against expensive tie-ups in case of broken insulators.

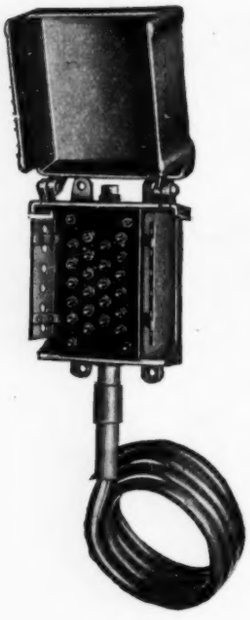
The photo above shows a lead of Northern White Cedar Poles on Blue Island Avenue, Chicago, carrying 60 No. 14 iron wires and 100 pr. cable.

For Low Cost Per Pole Per Year
Investigate Northern White Cedar Poles

Northern White Cedar Association
Lumber Exchange **Minneapolis, Minnesota**

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

GR POLE CABLE TERMINALS



Cast Iron
Hot-Galvanized

Weather-Proof
Accessible

Husky Lock-Nut
Binding Posts

Lead Sleeve
Protects
Cable Stub

Maple Panels
No Sweating
No Leakage

Reliable Electric Company

3145 Carroll Avenue Chicago, Illinois

AMERICAN LINE MATERIALS COMPANY

CROSSARMS THAT LAST

"RAINIER" FIR LONG LEAF PINE CREOSOTED

FOURTEEN MILLS MAKING THEM

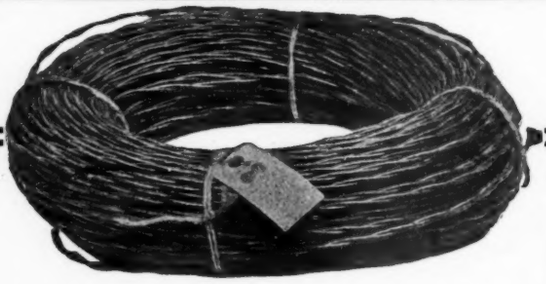
TWENTY-SIX WAREHOUSES DISTRIBUTING THEM

ASK YOUR DEALER FOR OUR PRODUCT

SUCCESSOR TO AMERICAN CROSSARM COMPANY

MAIN OFFICE CHICAGO

USE
TRADE MARK
HEMINGRAY
REGISTERED.
Standard Glass Insulators
HEMINGRAY GLASS CO., Muncie, Ind.



While the weather is fine prepare for next winter

None of the troubles that confront you in Winter are more costly and detrimental to service than those caused by breaking and failing drop wires. Now is a good time to install the drop wire that eliminates such troubles—

Ironite

This drop wire is so strong, tough and flexible that it withstands the most severe strains without stretching, sagging or breaking. It keeps down maintenance bills and safeguards you against service interruptions. Sample on request.

Paragon Battery Boxes

These neat, inexpensive containers protect your batteries against dust, dirt and broken connections.

Made of japanned sheet steel, insulated with fibre. Can be hung on a nail or set on a floor or shelf—always accessible.

Write for circular

Paragon Electric Co.

37 W. Van Buren St. Chicago, Ill.

710 Western Ave., Seattle, Wash.
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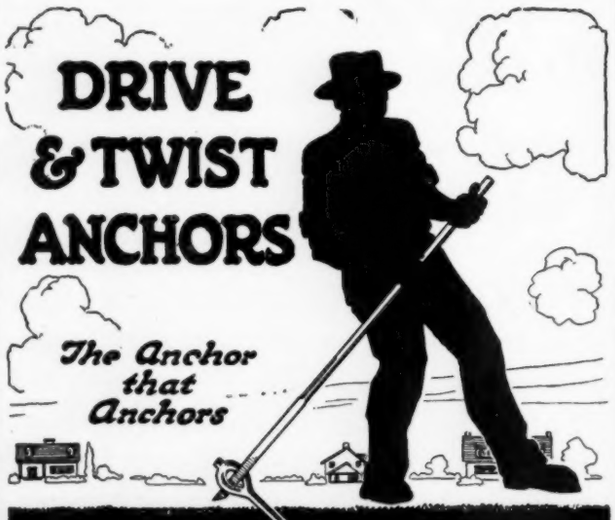

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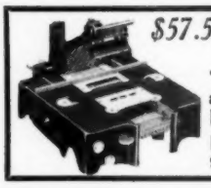
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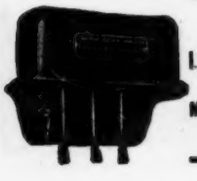
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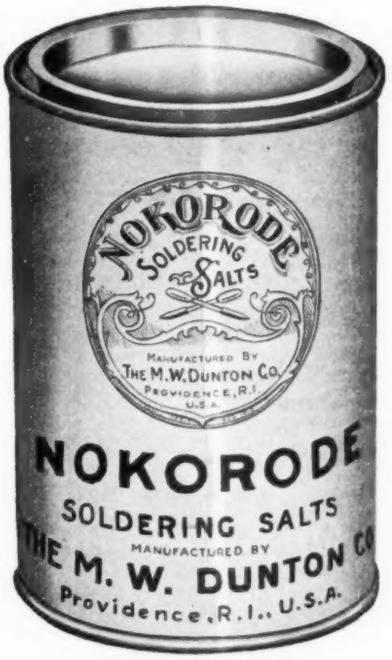

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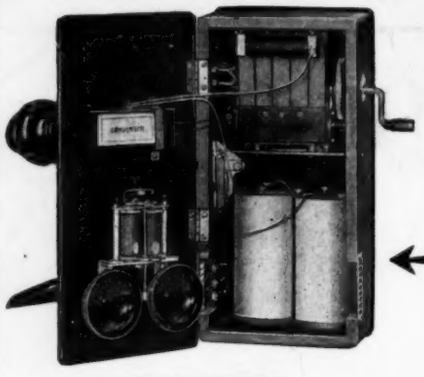

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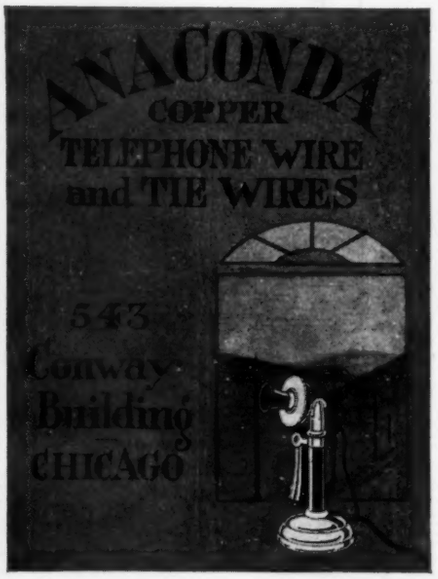

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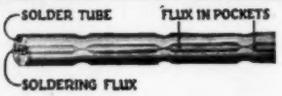

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